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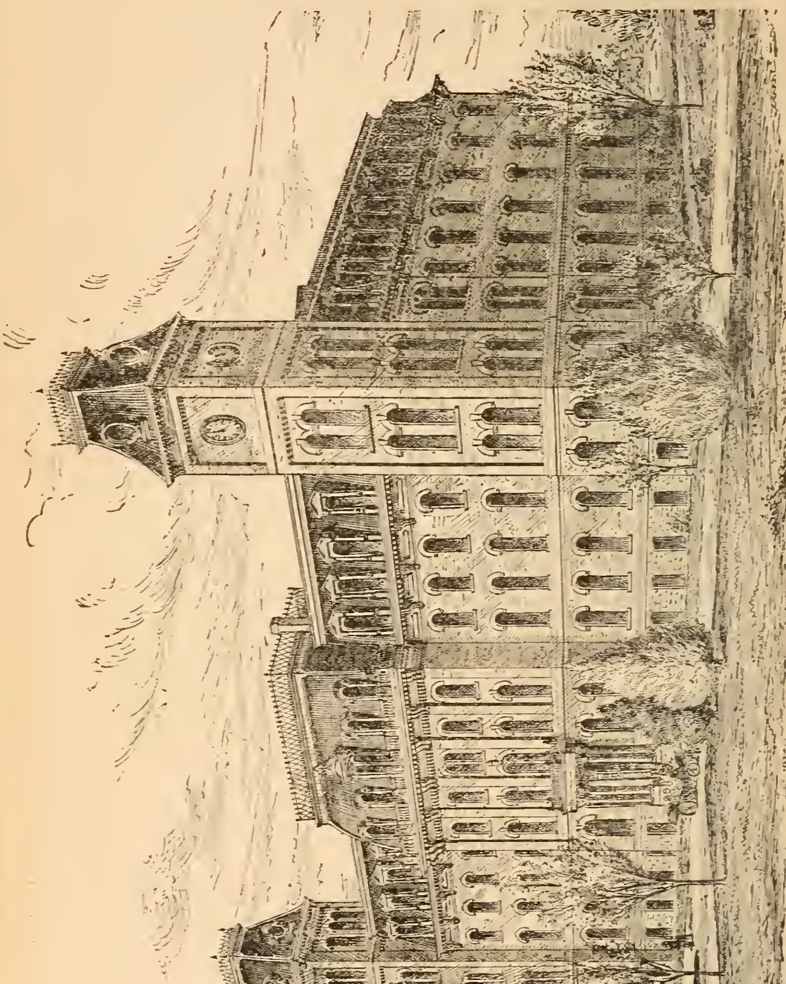

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LEARNING AND LABOR.

CATALOGUE AND CIRCULAR

OF THE

UNIVERSITY OF ILLINOIS,

URBANA, CHAMPAIGN COUNTY, ILL.

1886-87.

CHAMPAIGN.
GAZETTE STEAM PRINT.

1887.

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FACULTY.

SELIM H. PEABODY, Ph. D., LL D ,
REGENT, and Professor of Mechanical Engineering.

THOMAS J. BURRILL, M. A., Ph. D.,
Professor of Botany and Horticulture. and Vice President.

SAMUEL W. SHATTUCK, M. A., C. E ,
Professor of Mathematics.

EDWARD SNYDER, M. A.,
Professor of Modern Languages.

JOSEPH C PICKARD, M. A ,
Professor of English Language and Literature.

N. CLIFFORD RICKER, M. Arch ,
Professor of Architecture

JAMES D. CRAWFORD, M. A ,
Professor of History and Ancient Languages, and Secretary.

GEORGE E. MORROW, M. A ,
Professor of Agriculture.

PETER ROOS.
Professor of Industrial Art and Designing.

IRA O. BAKER, C E.,
Professor of Civil Engineering.

WILLIAM McMURTRIE, E. M., Ph. D.,
Professor of Chemistry and Mineralogy.

STEPHEN A. FORBES, Ph. D.,
Professor of Entomology and Zoology.

THEODORE B. COMSTOCK, Sc. D.,
Professor of Mining Engineering.

JAMES H. BROWNLEE, M. A.,
Professor of Rhetoric and Oratory.

CHARLES W. ROLFE, M. S.,
Professor of Geology.

DONALD McINTOSH, D. V. S.,
Professor of Veterinary Science.

HERBERT H. SARGENT,
Second Lieut. 2nd Cavalry, U. S. A.,
Professor of Military Science and Tactics.

REV. NATHANIEL BUTLER, Jr, M. A,
Professor of Latin.

ARTHUR T. WOODS,
Assistant Engineer, U. S. N.,
Assistant Professor of Mechanical Engineering.

ARTHUR N. TALBOT, C. E.,
Assistant Professor of Engineering and Mathematics.

WILLIAM H. GARMAN,
Assistant Professor of Zoology.

EDWIN A. KIMBALL,
Instructor of Iron-work, and Foreman.

GEORGE W. PARKER,
Instructor in Wood work, and Foreman.

SAMUEL W. STRATTON, B. S.,
Instructor in Mathematics.

CHARLES E. EGGERT, Ph. B.,
Instructor in Modern Languages.

MAUD KIMBALL,
Teacher of Vocal and Instrumental Music

ARTHUR W. PALMER, Sc. D,
First Assistant in Chemical Laboratory.

CHARLES B GREENE E. M,
Second Assistant in Chemical Laboratory.

THOMAS F. HUNT, B. S,
Assistant in Agriculture.

A. B BAKER,
Janitor.

State Laboratory of Natural History.

STEPHEN A. FORBES, Ph. D.,
DIRECTOR AND STATE ENTOMOLOGIST.

THOMAS J. BURRILL, Ph. D.,
Botanist.

WILLIAM H. GARMAN,
First Assistant.

CLARENCE M. WEED, M. S.,
Entomological Assistant.

CHARLES F. HART,
Assistant.

MARY J. SNYDER,
Stenographer.

CORA M. MALTBY,
Librarian.

LIST OF STUDENTS.

SENIOR CLASS.

GENTLEMEN.

NAME.	COURSE	RESIDENCE.
Barclay, William	Civil Engineering	East Wheatland.
Blake, John B.	Mechanical Engineering	Lombard.
*Bush, Lincoln	Civil Engineering	Orland.
Cantine, Edward I.	Civil Engineering & Military	Bloomington.
Clark, Percival L.	Chemistry	Elgin.
Dryer, Ervin	Mechanical Engineering	Champaign.
Fargusson, Mark	Civil Engineering & Military	Urbana.
Fink, Bruce	Natural History	Aurora.
*Gaskell, Beattie E.	Chemistry	Mascoutah.
Gilbert, Frank M.	Mechanical Engineering	Chicago.
Gill, Rudolph Z.	Architecture	Urbana.
*Goldschmidt, A. G.	Mechanical Engineering	Davenport, Iowa.
Goldschmidt, E. W.	Mechanical Engineering	Davenport, Iowa.
Goodwin, Phil A.	Civil Engineering & Military	Wilmington.
Gregory, Grant	Literature and Science	Champaign.
Henson, Charles W	Mechanical Engineering	Chicago.
Johnson, Edward S.	Civil Engineering & Military	Milan.
Lloyde, Clarence A.	Mechanical Eng. & Military	Champaign.
Long, Frank B.	Architecture	Virden.
Lyman, Henry M.	Mechanical Eng. & Military	Lemont.
Mitchell, Walter R.	Natural History	Bement.
*Moles, Oliver S.	Literature and Science	Brimfield.
Moore, Albert C.	Literature & Science & Mil.	Polo.
Powers, Mark	Chemistry	Fayetteville, Mo.
Richards, Albert L.	Mechanical Engineering	Burton.
Rinaker, John I. jr.	Architecture	Carlinville.
*Roberts, Warren R.	Civil Engineering	Sadorus.
Spear, Grant W.	Mechanical Engineering	Aurora.
Tatarian, Bedros	Chemistry	Constantinople, Turkey.
Taylor, Horace		Nokomis.
*Taylor, John W.	Civil Engineering	Charleston.
*Van Gundy, Chas. P.	Chemistry	Springfield.
Waite, Merton	Natural History and Military	Oregon.
Williams, Herbert B.	Mining Engineering	Farm Ridge.

NOTE.—A star (*) indicates that a student has not secured the full number of credits belonging to the class in which he is enrolled. He may have fallen behind this class, or he may have advanced beyond the class below.

LADIES.

NAME.	COURSE.	RESIDENCE.
Eisenmayer, Ida	Literature and Science	Mascoutah.
Gayman, Angelina	Literature and Science	Champaign.
*Mathers, Effie	Natural History	Mason City.
Williamson, Mary H.	Literature and Science	Urbana.

JUNIOR CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
*Baker, Frank D.	Mechanical Engineering	Wilmington.
Beadle, J. Grant	Architecture	Kewanee.
Bing, Benjamin	Chemistry	Urbana.
*Bopes, Charles A.	Agriculture	Hamlet.
Bowditch, Fred D.	Literature & Science & Mil.	Burnsville, N. C.
*Bryant, William C.	Architecture	Holton, Kansas.
*Carter, Truman P.	Natural History	Jacksonville.
Davis, Frank L.	Architecture and Military	Latham.
*Dewey, Ralph E.	Literature and Science	Penfield.
Ellison, Edward E.	Civil Engineering & Military	Marine.
*Evans, Rolla W.	Architecture	Bloomington.
*Fischer, J. George	Mechanical Engineering	Oregon.
Folger, Adolphus	Natural History	Ridge Farm.
Frederick, Grant	Literature and Science	Clarence.
*Goodell, Nathan P.	Literature and Science	Loda.
*Greaves, George	Mining Engineering	Aurora.
*Grindley, Harry S.	Agriculture	Champaign.
*Jones, Harry	Mechanical Engineering	Parnell.
McHugh, George B.	Chemistry and Military	Urbana.
*More, George F.	Mechanical Eng. & Military	Chicago.
Myers, George W.	Literature & Science & Mil.	Urbana.
Patton, Jacob A.	Chemistry and Military	Charleston.
Pickard, Edward W.	Ancient Language & Mil.	Urbana.
*Place, Raymond M.	Literature and Science	Atlanta.
Samuels, Jonathan H.	Mechanical Eng. & Military	Moline.
Sanford, William C.	Chemistry	Marengo.
Schaefer, John V. E.	Mechanical Engineering	Granville.
*Troyer, William L.	Agriculture	Dorchester, Neb.

LADIES.

NAME.	COURSE.	RESIDENCE.
Barnes, Mary Lena	Literature and Science	Champaign.
Beach, Etta L.	Literature and Science	Champaign.
Connet, Ella	Literature and Science	Champaign.
Jillson, Nellie W.	Literature and Science	Pittsburg, Pa.
McLean, Nellie	Literature and Science	Urbana.
*McLellan, Mary C.	Literature and Science	Champaign.
*Paine, Leanah J.	Literature and Science	Orizaba.
*Stoltey, Ida M.	Literature and Science	Champaign.

SOPHOMORE CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
*Aguilera, Rodrigo	Civil Engineering	Parral, Mexico.
*Allison, Lester T.	Literature and Science	Arlington Heights.
Barber, William D.	Mechanical Eng. & Military	Champaign.
Bennett, Cleaves	Ancient Languages	Mattoon.
Bennett, Frederick M.	Literature and Science	Atlanta.
*Bevis, Philemon	Architecture	Virginia.
Bowsher, Columbus A.	Civil Engineering	Barnet.
Briggs, C. Wesley	Literature and Science	Champaign.
Carver, Albert	Natural History and Military	Springfield.
Chester, Thaddeus P.	Agriculture	Champaign.
*Clarke, Herbert B.	Mechanical Engineering	Peoria.
*Coen, Edward B.	Natural History	Washburn.
*Coen, George H.	Natural History	Washburn.
*Davis, Elmer E.	Literature and Science	French Grove.
*Dunaway, Horace	Civil Engineering	Ottawa.
*Forbush, Henry W.	Architecture	Chicago.
*Gilliland, William M.	Mechanical Engineering	Coatsburg.
*Hay, Leon	Agriculture	Kankakee.
*Holly, William D.	Mechanical Engineering	Granville.
*Jackson, Wilbur S.	Agriculture	Warsaw.
*Keene, Edward S.	Mechanical Engineering	Moline.
Kendall, Harry F.	Literature and Science	Newton.
*Kinkead, David R.	Mechanical Engineering	Earlville.
*Lee, James M.	Literature and Science	Argenta.

NAME.	COURSE.	RESIDENCE.
Lewis, Almon	Architecture.	Joliet.
*Ligare, Edward F.	Mining Engineering	Glencoe.
*McCandless, Wallace	Mechanical Engineering	Orion.
McConney, Robert B.	Mechanical Engineering	Sadorus.
*McKee, Willie E.	Mechanical Engineering	Rising.
*Mackay, Philip A.	Chemistry	LaSalle.
*Means, William E.	Chemistry and Military	Peru.
Niles, Willie E.	Literature & Science & Mil.	Bement.
Parker, Harry	Civil Engineering	Princeton.
Peoples, U. J. Lincoln	Architecture	Allegheny City, Pa.
Piatt, Herman S.	Ancient Languages	Lincoln.
*Piper, Edward D.	Mechanical Engineering	Chicago.
*Powell, John E.	Civil Engineering	Powellton.
Ross, Luther S.	Natural History	Reno.
Rounds, William P.	Civil Engineering	Chicago.
*Ryan, James B.	Agriculture	Virden.
*Schaefer, Philemon	Civil Engineering	Parral, Mexico.
*Scott, Herman R.	Literature and Science	Sedalia, Mo.
*Spafford, Frank S.	Mechanical Engineering	Morrison
Steele, Philip	Mechanical Engineering	Pittsford, Vt.
Talbot, George S.	Civil Engineering	Cortland.
*Tieken, Theodore	Chemistry	Coatsburg.
*Tscharner, John B.	Civil Engineering	Okawville.
*Walker, Arthur E.	Chemistry	Champaign.
*Walter, Benjamin F.	Mechanical Eng. & Military	Maroa.
Warren, John B. jr.	Civil Engineering & Military	Hyde Park.
Weis, Herman L.	Mechanical Engineering	Tonica.
Weston, Nathan A.	Literature and Science	Champaign.

LADIES.

NAME.	COURSE.	RESIDENCE.
*Batchelder, Nancy J.	Chemistry	Warrensburg.
*Boyle, Annie C.	Literature and Science	Champaign.
Bronson, Lilly O.	Literature and Science	Urbana.
Church, Blanche A.	Literature and Science	Atlanta.
Coffeen, Amy	Literature and Science	Champaign.
*Godfrey, Eleanor	Literature and Science	Philo.
*Hodges, Frances E	Literature and Science	Champaign.
*Paine, Sarah M.	Natural History	Orizaba.

NAME.	COURSE.	RESIDENCE.
*Robinson, G. M.	Literature and Science	Champaign.
Shattuck, Anna F.	Literature and Science	Champaign.
*Sim, M. Eva	Literature and Science	Urbana.
*Smith, Grace C.	Literature and Science	St. Louis, Mo.
Sparks, Myrtle E.	Ancient Languages	Champaign.
*Willis, Mary B.	Literature and Science	Champaign.

FRESHMEN CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
*Adams, Alonzo T.	Mechanical Engineering	Marseilles.
Baird, Walter M.	Mechanical Engineering	Pierre, Dakota.
*Barnes, John	Architecture	Joliet.
Barr, James	Mechanical Engineering	Urbana.
Bawden, Samuel D	Mechanical Engineering	Champaign.
Beachem, Charles	Literature and Science	Gifford.
Beardsley, John	Literature and Science	Champaign.
Benson, Edward M.	Civil Engineering	Colfax.
Boecklin, Werner jr.	Civil Engineering	Burlington, Iowa.
*Bulpin, Thomas W.	Civil Engineering	Chicago.
*Bunton, Fred L.	Mechanical Engineering	Kewanee.
Camp, Norman H.	Natural History	Bement.
*Chapman, Arms S.	Literature and Science	Danforth.
*Clark, Frank H.	Mechanical Engineering	Urbana.
Clark, Thomas A.	Literature and Science	Champaign.
Clarkson, James F.	Civil Engineering	Chicago.
Clinton, George P.	Natural History	Polo.
Cooke, Robert J.	Civil Engineering	East Newbern.
Cornelison, Robt. W.	Chemistry	Washington.
Crabbs, Clarence L.	Civil Engineering	Gibson City.
*Cunningham, Geo.	Chemistry	Champaign.
Donoghue, John T.	Literature and Science	LaSalle.
*Eichberg, Louis R.	Chemistry	Chicago.
Fisher, Frank	Civil Engineering	Indianola.
Flanigan, William T.	Agriculture	White Heath.
Frazer, Herbert A.	Natural History	Plainfield.
Frederickson, Wm J.	Literature and Science	Champaign.

NAME.	COURSE.	RESIDENCE.
*Fuller, James	Civil Engineering	Buda.
Fulton, Frank T.	Agriculture	Warsaw.
*Gelder, Tolman T.	Literature and Science	Virden.
*Gerty. Frank K.	Natural History	Chicago.
*Hanssen, G. Adolph	Architecture	Davenport, Iowa.
Hazelton, Hugh	Mechanical Engineering	Forest Glen.
*Henley, John L.	Literature and Science	Mattoon.
Hill, Hardy F.	Agriculture	Charleston.
*Howland, Howard N.	Civil Engineering	Ottawa.
*Ingels, Henry G.	Mechanical Engineering	Chatham.
Jurado, Miguel	Agriculture	Parral, Mexico.
Kinder, David R.	Literature and Science	Litchfield.
*Lewis, G. Felix	Mechanical Engineering	Washington.
*Lewis, James L.	Literature and Science	Tuscola.
*McCluer, Hugh A.	Agriculture	Farina.
*Machan, George S.	Literature and Science	Argenta.
*McHugh, Austin F.	Literature and Science	Sedan, Kan.
*McIntyre, Wm. B.	Literature and Science	Ransom.
Manny, Walter I.	Literature and Science	Mound Station.
Moore, Byron L.	Chemistry	Champaign.
Nesbit, Edwin	Mechanical Engineering	Charleston.
Norton, Fred E.	Mechanical Engineering	Little Rock, Ark.
*Parker, Hervey E.	Architecture	Champaign.
Procter, Orla	Agriculture	Rome.
Reeves, Will H.	Architecture	Bloomington.
Shamel, Charles H.	Chemistry	Willey.
Smith, Harry J.	Mechanical Engineering	Allegheny City, Pa.
Snyder, C. Henry	Civil Engineering	Fulton.
*Sperry, William L.	Literature and Science	Champaign.
Sprague, Edwin B.	Literature and Science	Bement.
Standuhar, George P.	Architecture	Mahomet.
*Stebbins, M. Willett	Architecture	Springfield.
Storer, Frederic E.	Architecture	Nebraska City, Neb.
Terbush, Linsley F.	Literature and Science	Champaign.
Thomas, Marion E.	Civil Engineering	Bellmore, Ind.
Tresise, Frank J.	Civil Engineering	Sharon, Pa.
*Tuck, William O.	Mechanical Engineering	Plymouth.
Vennum, Fred. D.	Literature and Science	Watseka.
Waite, Edwin F.	Civil Engineering	Sycamore.
Waterman, Fred W.	Mechanical Engineering	Sycamore.

NAME.	COURSE.	RESIDENCE.
*Wheeler, R. O.	Architecture	Chicago.
White, James M.	Architecture	Peoria.
Wilbur, Frank D.	Literature and Science	Champaign.
Wilkinson, George E.	Mechanical Engineering	Argenta.
Wilson, Amber F.	Chemistry	Neoga.
Wood, Robert A.	Mechanical Engineering	Woodburn.

LADIES.

NAME.	COURSE.	RESIDENCE.
*Bland, Mattie	Literature and Science	Todd's Point.
Brumbach, Lucia R.	Literature and Science	Gilman.
*Carson, Annie	Literature and Science	Urbana.
Clark, Edith L.	Literature and Science	Urbana.
Digby, Alice	Chemistry	Barry.
Ellars, Jessie	Ancient Languages	Tuscola.
Jones, Mabel	Literature and Science	Champaign.
Kennard, Kate	Literature and Science	Champaign.
Maxwell, Nellie	Literature and Scien e	Champaign.
Moss, Minnie	Architecture	Champaign.
Parr, Kate W.	Literature and Science	Champaign.
Shattuck, Edith A.	Literature and Science	Champaign.
Stevens, Geralda M.	Literature and Science	Champaign.
Swannell, Mary	Literature and Science	Champaign.
Weston, Maggie	Literature and Science	Champaign.

PREPARATORY CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Asay, Joseph E.	Literature and Science	Reynolds.
Barclay, Thomas		Plainfield.
Bell, Carroll M.	Mechanical Engineering	Warsaw.
Boerckel, Samuel	Civil Engineering	Peoria.
Bowker, Ernest S.	Mechanical Engineering	Gibson City.
Brueggeman, George	Mining Engineering	Belleville.
Buck, Charles		Bloomfield, Mo.
Chapple, George D.		Marseilles.
Chipron, Francis		Highland.

NAME.	COURSE.	RESIDENCE.
Cody, Richard J.	Literature and Science	Chicago.
Copeland, Samuel L.	Chemistry	Vienna.
Darby, Will E.	Literature and Science	Urbana.
Devoe, Charles E.		Champaign.
Devol, Arthur W.	Mechanical Engineering	Otterville.
Dinwiddie, Edwin	Mechanical Engineering	Maroa.
Dresback, Joseph F.		Mayview.
Eidmann, Edward C.	Civil Engineering	Mascoutah.
Ellis, Greek E.	Civil Engineering	Riverton, Iowa.
Foster, Zebulon	Civil Engineering	Armstrong.
Francis, Bruce R.	Civil Engineering	Peoria.
Frederick, Sherman		Clarence.
Furst, Oliver	Mechanical Engineering	Peoria.
Gardner, Frank D.	Agriculture	Gilman.
Gibson, Charles	Civil Engineering	South Grove.
Gibson, E. Charles	Mechanical Engineering	Peoria.
Goudie, Charles	Chemistry	Sadorus.
Green, Thomas S.	Natural History	Jacksonville.
Haddock, Frank D.	Mechanical Engineering	Chicago.
Haley, George S.	Mechanical Engineering	Buda.
Hall, Lyman	Chemistry	Savoy.
Halliday, Samuel	Agriculture	Cairo.
Hambleton, Arthur R.		Keokuk, Iowa.
Hammet, Charles B.	Mechanical Engineering	Camargo.
Harris, William H.		Seymour.
Holder, Willis		Dewey.
Jaquess, Herbert W.		Cincinnati, Ohio.
Jones, Henry A.	Civil Engineering	Cairo.
Jones, Willie A.		Windsor.
Joy, Walter C.	Mechanical Engineering	Jacksonville.
Kiefer, Albert	Civil Engineering	Peoria.
Klingenhoefer, Wm.	Civil Engineering	Mascoutah.
Layton, Will E.	Mechanical Engineering	Jacksonville.
Leonard, Elmer A.	Mechanical Engineering	Tremont.
Leonard, Thomas E.	Mechanical Engineering	Tremont.
Lewis, Adelbert	Literature and Science	Pawnee.
Linder, John	Mechanical Engineering	Manhattan, Kan.
Martin, Harvey J.	Chemistry	Elwin.
Mitchell, Joseph A.	Natural History	Fairmount.
Newell, Samuel R.		Sedan, Kan.

NAME.	COURSE.	RESIDENCE.
Parkman, Charles C.	Architecture	Philo.
Pauley, Leander J.	Literature and Science	Forrest.
Pepper, William W.	Literature and Science	Oakland.
Powell, John H.	Civil Engineering	Shawneetown.
Radebaugh, Otis B.		Urbana.
Reed James C.	Literature and Science	Galton.
Richardson, Henry E.	Literature and Science	Mascoutah.
Robison, Edgar	Agricnlture	Towanda, Kan.
Rumbold, Joseph	Literature and Science	Forrest.
Russell, Frank S.		St. Joseph.
Sanders, George L.	Mechanical Engineering	Waterloo, Iowa.
Sargent, Jacob F		Carlinville.
Shamel, Clarence A.		Willey.
Shannon, James S. jr.	Architecture	Hinsdale.
Shepardson, Chas O.	Literature and Science	Paxton.
Shepardson, Geo. A.		Paxton.
Smith, Ethiel B.		Forrest.
Smith, George P.	Mechanical Engineering	Clay City.
Smith, James H.	Ancient Languages	Champaign.
Sperry, Eldridge H.		Champaign.
Steel, Frank M.	Civil Engineering	Rock Island.
Stevens, Fred W.	Agriculture	Odell.
Stokes, Wallace R.	Mechanical Engineering	Bellmore, Ind.
Terrill, Joseph S.	Natural History	Aurora.
Torrance, Harry S.	Mechanical Engineering	Cairo.
Tubbs, H. Rolla		Kirkwood.
Vulliet, Francis L.	C vil Engineering	Highland.
Wagner, Joseph		Spring Bay.
Whitaker, Dick R.	Mechanical Engineering	Peru.
White, Spencer M.		Dewey.
Wilson, James F.	Civil Engineering	Mt. Palatine.
Yamada, Sitsuro	Agriculture	Wakamaten, Japan.
Zimmerman, H. H. jr.		Harvel.

LADIES.

NAME.	COURSE.	RESIDENCE.
Broaddus, Alice V.		Henry.
Crouch, Nannie M.	Literature and Science	Rozetta.
Darby, Nellie M.		Urbana.

NAME.	COURSE.	RESIDENCE.
Gerber, Mary		Argenta.
Harris, Jessica V.		Kalamazoo, Mich.
Hubbart, Edith		Deland.
Ice, Hortense		Armstrong.
Norton, Hattie		Bondville.
Webber, Grace	Literature and Science	Urbana.

SPECIALS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Baldwin, Boyd	Agriculture	Ellisville.
Boyer, Emanuel R.	Natural History	Lewistown.
Corkery, T. W.	Veterinary Science	Urbana.
Daugherty, Lewis S.	Natural History	Urbana.
Dick, Cyrus	Architecture	Mahomet.
Dobson, Frederick H.	Agriculture	Cerro Gordo.
Douglass, Charles L.	Agriculture	Marseilles.
Gerspach, John A.	Architecture	Madison, Wis.
Gilmore, Charles P.	Agriculture	New Boston.
Green, Arthur J.	Architecture	Farmington.
Green, Ed	Agriculture	Indianola.
Guilbert, Guy F.	Architecture	Dubuque, Iowa.
Horn, Thomas	Agriculture	DuQuoin.
Miles, John W.	Agriculture	Virginia.
Morse, Burt	Architecture	Rapatee.
Mudge, Charles H.	Agriculture	Peru.
Quirk, Rev. M. A.	German	Champaign.
Roberts, William E.	Agriculture	Sadorus.
Robison, Leslie W.	Agriculture	Towanda, Kansas.
Tamari, Kizo	Biology	Tokio, Japan.

LADIES.

NAME.	COURSE.	RESIDENCE.
Baker, Kate F.	Art and Projection Drawing	Champaign.
Dana, Essie G.	Art and Design	Champaign.
Morrow, Minnie	Art and Design	Champaign.
Sim, Keturah E.	Art and Latin	Urbana.

SUMMARY.

BY CLASSES.	GENTLEMEN.	LADIES.	TOTAL.
Seniors	34	4	38
Juniors	28	8	36
Sophomores	52	14	66
Freshmen	73	15	88
Preparatory	83	9	91
Special	20	4	24
Total	289	54	343

BY COURSES.	GENTEEMEN.	LADIES.	TOTAL.
Agriculture	29		29
Mechanical Engineering	65		65
Civil Engineering	45		45
Mining Engineering	4		4
Architecture	27	1	28
Chemistry	23	2	25
Natural History	19	2	21
Art and Design	1	4	5
English and Modern Languages	48	36	84
Ancient Languages	4	2	6
Not Specified	24	7	31
Total	289	54	343

University of Illinois.

HISTORY.

The University of Illinois had its origin in a movement for the higher education of the industrial classes, begun in 1851, and resulting in the congressional grant of lands for this purpose, made to the several States in 1862, and amounting in this State to 480,000 acres. The University was chartered in February, 1867, and opened to students in March, 1868. In addition to the endowment from the land grant, over $400,000 were donated by Champaign county in bonds, buildings, and farms. The State also has made large appropriations for fitting up and stocking the farms, for library and apparatus, and for buildings, including the large Main building erected in 1872 and 1873, the Mechanical Building and Drill Hall, and the Chemical Laboratory. Successive Colleges and schools have been added as required, until four Colleges, including eleven distinct Schools, have been organized.

The whole number matriculated as students since the opening is 2,137. The number graduated from the several Colleges, including the class of 1886, is 484. In 1871 the University was opened for lady students, on the same terms as to gentlemen. In 1874 a Fine Art Gallery was established. In 1876 the University received from the Centennial Exposition at Philadelphia, three diplomas and a medal. In 1877 its exhibit at the Paris International Exposition gained a diploma and the gold medal.

LOCATION.

The University has a beautiful and healthful situation on the high grounds between the cities of Champaign and Urbana, and within the corporate limits of the latter. It is one hundred and twenty-eight miles south from Chicago,

at the junction of the Illinois Central, the Indiana. Bloomington and Western, and the Wabash railways. The country is a region of beautiful rolling prairies, with large belts of timber along the streams, and is one of the richest farming districts in the State.

BUILDINGS AND GROUNDS.

The domain occupied by the University and its several departments, embraces about 623 acres, including stock farm, experimental farm, orchards, nurseries, forest plantation, arboretum, ornamental grounds, and military parade grounds.

The University buildings, fifteen in number, include a grand Main Building, a spacious Mechanical Building and Drill Hall, a large Chemical Laboratory, a Veterinary Hall, a small Astronomical Observatory, two dormitories, three dwellings, two large barns, and a green-house.

The Main University Building, designed wholly for public uses, occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. The Library wing is fire proof, and contains in spacious halls the Museum of Natural History, the Library, the Art Gallery, and the Museum of Industrial Art. The Chapel wing contains the Chapel, the Physical Laboratory and Lecture Room, and rooms for draughting and drawing. In the main front are convenient class-rooms; on the upper floor, elegant halls for literary societies. The building is warmed by steam from a boiler-house which forms the fourth side of the quadrangle in the rear.

The Mechanical Building and Drill Hall is of brick, 126 feet in length, and 88 feet in width. It contains a boiler-room, a machine shop, furnished for practical use with a steam engine, lathes, and other machinery; pattern and finishing shop; shops for carpentry and cabinet-work, furnished with wood-working machinery; paint and draughting rooms, and rooms for models, storage, etc. An addition built lately for a blacksmith shop, 32 by 36 feet, contains sixteen forges with anvils and tools, and a cupola for melting iron. In the second story is the large Drill Hall, 124 by 80 feet, sufficient for the evolutions of a company of infantry or a section of a battery of field artillery. It is also supplied with gymnastic apparatus. One of the towers contains an armorer's shop and an artillery room; the other contains a printing office and editor's room.

The Chemical Building erected in 1878, at a cost, including furniture, of $40,000, contains five laboratories, and is one of the best and largest in the United States.

PROPERTY AND FUNDS.

Besides its lands, buildings, furniture, library, etc., valued at $400,000, the University owns 16,000 acres of well selected lands in Minnesota and Nebraska. It has also endowment funds invested in State and County bonds amounting to about $447,000.

Museums and Collections.

The Museum of Zoology and Geology occupies a hall 61 by 79 feet, with a gallery on three sides, and is completely furnished with wall, table, and alcove cases. It already contains interesting and important collections, equaled at few, if any, of the colleges of the West. They have been specially selected and prepared to illustrate the courses of study in the school of natural history, and to present a synoptical view of the zoology of the State.

Zoolo .—The mounted *mammals* comprise an unusually large and instructive collection of the ruminants of our country, including male and female moose and elk, bison, deer, antelope, etc.; and, also, several quadrumana, large carnivora and fur-bearing animals, numerous rodents, and good represenitive marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens.

The collection of mounted *birds* (about five hundred specimens of two hundred and forty species) includes representatives of all the orders and families of North America, together with a number of characteristic tropical forms. Many of these specimens are excellent examples of artistic taxidermy. A series of several hundred unmounted skins is available for the practical study of species.

The set of *skeletons* contains examples of all the orders of mammals and birds except Proboscidea, together with typical representatives of the principal groups of reptiles, amphibians, and fishes.

The *cold-blooded vertebrates* are also illustrated by a very useful collection of alcoholic specimens, plaster casts, and mounted skins of the larger species, both interior and marine.

Conchology is illustrated by several thousand sheils belonging to seventeen hundred species; together with alcoholic specimens of all classes and orders. The collection of Illinois shells is creditable, although incomplete.

The *entomological cabinet* contains about three thousand species (principally American) named, labelled, and systematically arranged. The *lower invertebrates* are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

Geology.—The geological collection comprises many of the largest and most remarkable fossils hitherto discovered in the various geological formations, illustrating the general progress of life in the mollusks, fishes, reptiles, and mammals, from the oldest palæozoic time to the present. A fine set of fossils from Germany, and collections, suitably arranged for practical study from this and other States, illustrate the different formations. There is a good collection of foot-prints from the Connecticut river sand-stones.

In *Entomology* numerous species have been contributed by the State Entomologist, who is required by law to deposit his first series of specimens in the cabinet of the University. Local collections and exchanges have increased the number to about three thousand species. The recent establishment at the University of the office of the State Entomologist of Illinois makes available to students of this subject the entomological library and the collections of that office, and affords an extraordinary opportunity for observation of the methods of work and research in economic entomology.

Botany.—The herbarium contains about one thousand species of plants indigenous to Illinois, including nearly complete sets of grasses and sedges. There are, besides, many other North American plants and some exotics. A collection of Fungi, includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees, well illustrates the varieties of native wood. The trees and shrubs of Stephenson county, Illinois, are represented by a distinct collection.

Plaster casts represent fruits of many of the leading varieties, as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

Lithology.—This collection embraces the principal kinds of metamorphic and volcanic rocks; examples of stratification in the limestone and fragmental kinds, with many samples of such rocks as are found most valuable for building purposes.

Mineralogy.—The specimens of minerals show all the groups, and all the important and typical species. All the metals are represented, also many of their most important combinations. Many of the specimens are finely crystalized; these, with a complete set of imported models, fully illustrate crystalography.

Agricultural.—A large collection of soils from different portions of Illinois, and other States; many varieties of corn, wheat, and other cereals and seeds; specimens illustrating the official State Inspection of grains at Chicago, showing the quality of the different grades recognized; a collection of grains, seeds, nuts, etc., from Brazil; some hundreds of models of agricultural inventions; models illustrating modes and materials for drains; casts of ancient plows; engravings, lithographs, and photographs of typical animals of noted breeds.

The farms give good illustrations of farm buildings, implements, machinery, modes of culture, and of domestic animals of various classes.

Physics.—The Cabinets of the Physical Laboratory contain a collection of apparatus from the most celebrated European and American makers, illustrating the subjects of Mechanics, Pneumatics, Optics, and Electricity. Ample facilities are afforded to students for performing experiments of precision by which the theories of Physical Science may be tested and original work may be done.

A series of standard weights and measures from the office of the Coast and Geodetic Survey of the United States Government may be consulted at the Physical Laboratory.

A five-light Weston dynamo has lately been placed in the machine shop, and is connected with the physical and chemical laboratories for experimental purposes.

The Mechanical Laboratory is provided with a steam engine, engine and hand lathes, planer, shapers, milling-machine, drill presses, and the requisite hand tools, benches, vises, anvils, etc., for pattern-shop, blacksmith-shop, moulding-room, and bench work. Its cabinets contain several hundred models of elements of mechanism and machines from Schroeder, Riggs, the patent-office, and from the work-shops of the University. Important additions to the equipment

of tools and machines have been made during the last year, including a Testing Machine of most approved design, having a capacity of 100,000 pounds.

Mining Engineering is illustrated by a valuable series of models, obtained from Freiburg, illustrating sections of mines, machinery for elevating and breaking ore, with furnaces and machinery for metallurgical processes.

ART GALLERY.

The University Art Gallery is one of the largest and finest in the West. It was the gift of citizens of Champaign and Urbana. It occupies a beautiful hall, 61x79 feet, and the large display of Art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full-size casts of celebrated statues, including the Laocoon group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over 400 pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools. Also a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France. The value of this splendid collection, as a means of education, is shown in the work of the School of Drawing and Design of the University.

MUSEUM OF INDUSTRIAL ARTS.

A large room is devoted to the gathering of a museum of practical art, the materials for which are constantly accumulating in the various schools of science. It contains full lines of illustrations of the work of the shops; models made at the University or purchased abroad; drawings in all departments; patent-office models, etc.; samples of building materials, natural and artificial; a large collection illustrating the forestry of Illinois, Florida, and California; with whatever may be secured that will teach or illustrate in this most important phase of University work; the elegant exhibit made by the University at the Centennial and Cotton Exposition at New Orleans finds a permanent abode in this apartment.

A notable feature of this collection is the gift of Henry Lord Gay, Architect, of Chicago. It consists of a model in

plaster, and a complete set of drawings, of a competitive design for a monument to be erected in Rome, commemorative of Victcr Emanuel, first King of Italy. The monument was to be of white marble, an elaborate gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter million of francs. The design was placed by the art committee second on a list of 289 competitors; but both the first and second were set aside for political reasons. Mr. Gay's generous gift occupies the place of honor in the Museum of Industrial Arts.

LIBRARY.

The Library, selected with reference to the literary and scientific studies required in the several courses, includes over 16,000 volumes, and additions are made every year.

The large library hall, fitted up as a reading-room, is open throughout the day for study, reading, and consulting authorities. It is intended that the use of the Library shall largely supplement the class-room instruction in all departments. Constant reference is made in classes to works contained in the Library, and their study is encouraged or required. The reading room is well provided with American, English, French, and German papers and periodicals, embracing some of the most important publications in science and art. The following periodicals are regularly received:

PERIODICALS IN THE LIBRARY, 1887.

AGRICULTURAL AND HORTICULTURAL.

Prairie Farmer.
Western Rural.
Country Gentleman.
Breeder's Gazette.
Indiana Farmer.
Agricultural Gazette, *London.*
Gardeners' Chronicle, *London.*
American Agriculturist.
Western Agriculturist.
Live Stock Journal, monthly and weekly.
Horticulturist.
Farmers' Review.
Veterinary Journal.
Industrialist.
Farm, Field and Stockman.
Rural New Yorker.
Fruit Growers Journal.
American Garden.
American Florist.
Hoard's Dairyman.

ENGINEERING.

Builder, *London.*
American Engineer.
Transactions American Society of Civil Engineers.
Engineering News.
Engineering and Mining Journal.
Scientific American.
Scientific American Supplement.
Sanitary Engineer.
Railroad and Engineering Journal.
American Architect.
American Machinist.
Western Manufacturer.
Gazette of Patent Office.
Mechanics.
Locomotive.
American Artisan.

SCIENTIFIC.

Annales des Sciences Naturelles, Botanique, *Paris.*
Annales des Sciences Naturelles, Zoologie, *Paris.*
Science.
Nature, *London.*
American Naturalist.
Grevillea, *London.*
Decorator and Furnisher.
Art Amateur.
Portfolio, *London.*
Comptes Rendus, *Paris.*
Chemical News, *London.*
Journal of Chemical Society, *London.*
American Journal of Chemistry.
Annals and Magazine of Natural History, *London.*
Boston Journal of Chemistry.
Jahrbericht der Chemie, *Giessen.*
Zeitschrift fur An Chemie.
Berichte der Deutschen Chemischen Gesellschaft, *Berlin.*
Popular Science Monthly.
American Journal of Mathematics.
American Journal of Science and Art.
Journal of Franklin Institute.
Journal de Mathematiques.
Mathematical Quarterly.
Annals of Mathematics.
Monthly Weather Review.
Proceedings of American Philosophical Society.
Annales des Mines.
Revue d'Architecture.
Journal of Physiology.
Geological Magazine.

LITERARY AND NEWS.

Nineteenth Century.
Edinburg Review.
Contemporary Review.
Fortnightly Review.
North American Review.
Atlantic Monthly.
Century.
Dial.
Literary World.
Education.
Legal Adviser.
Revue des Deux Mondes, *Paris.*
Deutsche Rundschau, *Berlin.*
Congressional Record.
Champaign County Gazette.
Champaign Times.
Musical Record.
Signal.
The Rock-Islander.
Witness.
English Historical Magazine.
Library Journal.
United States Government Publications.
Daily Illinois State Journal.

The exchanges of the *Illini* are also free to the students in the Library.

Aims of the University.

The University is both State and National in origin. Its aims are defined by the following extracts from the laws of Congress and the State Legislature:

"Its leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislature of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and profession in life."—*Act of Congress 1862, Sec. 4.*

"The Trustees shall have the power to provide the requisite buildings, apparatus, and conveniences, to fix the rates of tuition, to appoint such professors and instructors, and establish and provide for the management of such model farms, model art, and other departments and professorships as may be required to teach, in the most thorough manner, such branches of learning as are related to agriculture and the mechanic arts, and military tactics, without excluding other scientific and practical studies."—*Act of General Assembly, 1867, Sec. 7.*

In accordance with the two acts above quoted, the University holds, as its principal aim, to offer freely the most thorough instruction which its means will provide, in all the branches of learning useful in the industrial arts, or necessary to "the liberal practical education of the industrial classes, in the several pursuits and professions in life." It includes in this all useful learning—scientific and classical,—all that belongs to sound and thorough scholarship.

ORGANIZATION OF THE UNIVERSITY.

COLLEGES AND SCHOOLS.

The Institution is a University in the American sense, though differing designedly in the character of some of its

Colleges from the older institutions of this country. It embraces four Colleges, which are subdivided into Schools. A School is understood to embrace the course of instruction needful for some one profession or vocation. Schools that are cognate in character and studies, are grouped in the same College. The following are the Colleges and Schools:

I. COLLEGE OF AGRICULTURE.

II. COLLEGE OF ENGINEERING.

School of Mechanical Engineering.
School of Civil Engineering.
School of Mining Engineering.
School of Architecture.

III. COLLEGE OF NATURAL SCIENCE.

School of Chemistry. School of Natural History.

IV. COLLEGE OF LITERATURE AND SCIENCE.

School of English and Modern Languages.
School of Ancient Languages.

V. ADDITIONAL SCHOOLS.

School of Military Science. School of Art and Design.

Vocal and Instrumental Music are also taught, but not as parts of any regular course.

CHOICE OF STUDIES.

From the outset, the University has permitted great freedom in the selection of studies. It is, however, necessarily required: that the student shall be thoroughly prepared to enter and to keep pace with the classes in the chosen studies, and that he shall take these studies in the terms in which they are taught. *Candidates for a degree must take the course of study prescribed for that degree.*

Each student is expected to have three distinct studies, affording three class exercises each day. On special request, the Faculty may allow less or more.

No change in studies may be made after the beginning of a term without permission of the Faculty.

Due care will be taken to prevent, as far as possible, all abuse of the liberty of choice. Students failing to pass satisfactory examinations in their chosen studies, will not be permitted to remain and take other studies without a vote of the Faculty.

REQUIRED STUDIES.

To secure the diffusion of the sciences relating to the great industries, the State Legislature, in 1873, prescribed that each student should be taught some of those sciences.

The Trustees accordingly require that each student shall take, each term, one study at least from the following list:

Physics, Chemistry, Mineralogy, Physiography, Anatomy and Physiology, Botany, Zoology, Geology, Entomology; Drawing and Designing, Mathematics, Surveying; Elements of Agriculture and Horticulture, Vegetable Physiology, Agricultural Chemistry, Agricultural Engineering and Architecture, Animal Husbandry, Rural Economy, Landscape Gardening, History of Agriculture, Veterinary Science; Architectural Drawing and designing, Elements of Construction, Graphical Statics, History and Esthetics of Architecture, Estimates, Mining Engineering, Metallurgy, Analytical Mechanics, Geodesy, Principles of Mechanism, Hydraulics, Thermodynamics, Strength of Materials, Prime Movers, Mill Work, Machine Drawing, Roads and Railroads, Construction and Use of Machinery, Modeling and Patterns, Bridges, Stone Work, Astronomy; Military Science, Political Economy, Logic, and Mental Science.

EXAMINATIONS FOR ADMISSION.

Examinations of candidates for admission to the University, or any of its departments, are held at the University itself, on the two days previous to the opening of each term. These examinations embrace the following studies:

1. English Grammar, Arithmetic, Geography, and History of the United States, for all the Colleges. These examinations are as thorough as those required for second-grade certificates for teachers in the public schools.

2. Algebra, including equations of second degree and the calculus of radical qualities; Geometry, plain and solid. These are required also for all the Colleges.

3. Physiology, Botany, Natural Philosophy, English Rhetoric and Composition, These are required, in addition

to the subjects specified in 1 and 2, for candidates for the Colleges of Agriculture, Engineering, and Natural Science.

4. Physiology, Botany, Natural Philosophy; Latin Grammar and Reader, Cæsar, Cicero, Virgil, and Latin Prose Composition, in addition to 1 and 2, for School of English and Modern Languages.

5. Latin (as in 4), Greek Grammar and Reader, four books of Xenophon's Anabasis, and Greek Prose Composition in addition to the subjects of 1 and 2, for candidates for School of Ancient Languages.

For further information concerning terms of admission, see "*Admission*" under the several Colleges; also, "*Preliminary year.*"

COUNTY SUPERINTENDENTS' CERTIFICATES.

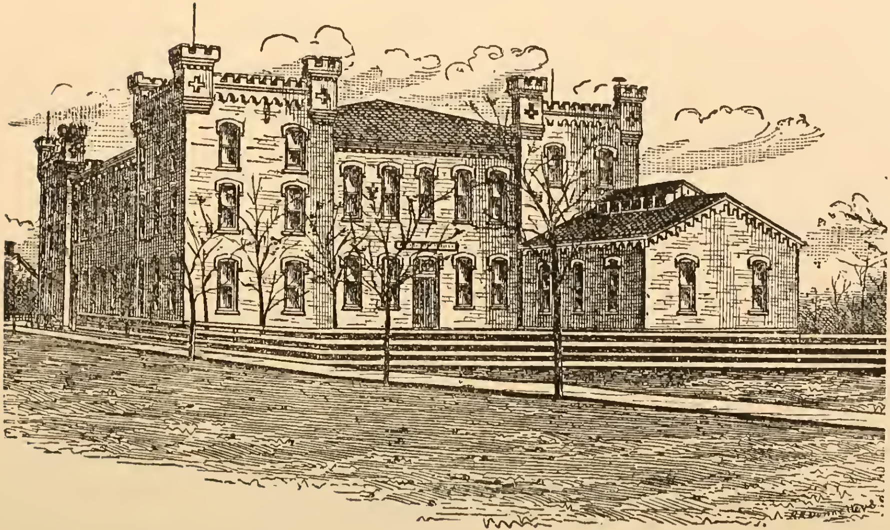
To prevent loss to those who are not prepared to enter the University, but might come, hoping to pass the examinations for admission, the following arrangement has been made:

County Superintendents of Schools will be furnished with questions and instructions for the examination of candidates in the four common branches, Arithmetic, Geography, English Grammar, and History of the United States; applicants who pass creditably will, when they present the superintendent's certificate to that effect, be admitted to the classes of the Preliminary year.

HONORARY SCHOLARSHIPS.

The trustees have determined that examinations may be conducted in the several counties of the state by the county superintendents thereof, on the first Friday and Saturday of June next. The examinations are upon the subjects named above. They will be in writing, and the papers will be sent to the University to be passed upon by the officers there. The pupil in each county who obtains the highest average in this examination, but not less than 80, nor less than 75 in any one subject, will receive an HONORARY SCHOLARSHIP upon which he may attend the University for FOUR YEARS, free of charge *for tuition or incidental Expenses.* There may be one scholarship for each county in the state. The total value of this scholarship to the successful candidate is $90.

Similar examinations will be held in June of each year in counties for whom no Honorary Scholarship is held by any student.



DRILL HALL AND MACHINE SHOP.

College of Agriculture.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, Ph. D., LL. D., Regent.
GEORGE E. MORROW, A. M., *Dean*. Agriculture.
THOMAS J. BURRILL, A. M., Ph. D., Botany and Horticulture.
SAMUEL W. SHATTUCK, A. M., C. E., Mathematics.
EDWARD SNYDER, A. M., Modern Languages.
JOSEPH C. PICKARD, A. M., English Language and Literature.
PETER ROOS, Industrial Art.
WILLIAM McMURTRIE, E. M., Ph. D., Chemistry.
STEPHEN A. FORBES, Ph. D., Entomology and Zoology.
JAMES H. BROWNLEE, A. M., Rhetoric and Oratory.
CHARLES W. ROLFE, M. S., Geology.
HERBERT H. SARGENT, Lt. U. S. A, Military Science.
GEORGE W. PARKER, Woodwork.
DONALD McINTOSH, V. S., Veterinary Science.

ADMISSION.

Candidates for admission to the College of Agriculture must be at least fifteen years of age, and must pass satisfactory examinations in the common school branches and in the studies of the preliminary year. While by law, students may be admitted at fifteen years of age, in general it is much

better that they shall be eighteen or twenty. It will be well if candidates shall have pursued other studies besides those required for admission. The better the preparation the more profitable the course.

OBJECT OF THE COLLEGE.

The aim of this College is to educate scientific agriculturists and horticulturists. The frequency with which this aim is misunderstood, demands that it shall be fully explained. Many, who look upon agriculture as consisting merely in the manual work of plowing, planting, cultivating, and harvesting, and in the care of stock, justly ridicule the idea of teaching these arts in a college. The practical farmer who has spent his life in farm labors, laughs at the notion of sending his son to learn these from a set of scientific professors. But all this implies a gross misunderstanding of the real object of agricultural science. It is not simply to teach *how* to plow, but the reason for plowing at all—to teach the composition and nature of soils, the philosophy of plowing, of manures, and the adaptation of the different soils to different crops and cultures. It is not simply to teach *how* to feed, but to show the composition, action, and value of the several kinds of food and the laws of feeding, fattening, and healthful growth. In short, it is the aim of the true Agricultural College to enable the student to understand thoroughly all that man can know about soils and seeds, plants and animals, and the influences of light, heat, and moisture on his fields, his crops, and his stock; so that he may both understand the reason of the processes he uses, and may intelligently work for the improvement of those processes. Not "book farming" but a knowledge of the real nature of all true farming—of the great natural laws of the farm and its phenomena—this is the true aim of agricultural education. Agriculture involves a larger number of sciences than any other human employment, and becomes a fit sequence to any collegiate training.

The steady aim of the trustees has been to give the College of Agriculture the largest development practicable, and to meet the full demand for agricultural education, as fast as it shall arise. Agricultural students are especially invited to the University.

Boards of Agriculture, and Agricultural and Horticultural Associations are invited to co-operate with the University in its efforts to awaken a more general appreciation of the value of education, and to aid those who desire to avail themselves of its facilities for instruction.

INSTRUCTION.

The instruction unites, as far as possible, theory and practice—theory explaining practice and practice illustrating theory. The technical studies are taught mainly by lectures, with careful readings of standard agricultural books and periodicals, and frequent discussions, oral and written, of the principles taught. These are also illustrated by demonstrations and observations in the fields, stables, orchards, gardens, plant-houses, etc.

SPECIAL STUDIES.

AGRICULTURE.

Elements of Agriculture.—Outline of the general principles underlying Agriculture in its theory and practice, introductory to the technical and scientific studies of the course.

Agricultural Engineering and Architecture.—Arrangement of the farm; its improvement by mechanical means, as drainage and irrigation; its divisions, fences, hedges, etc.; its water supply; the construction of roads; arrangement, planning and construction of farm buildings; the construction, selection, care, and use of farm implements and machinery.

Animal Husbandry.—Principles of breeding and management of our domestic animals; description of all important breeds and varieties, giving their history and adaptations.

Rural Economy.—Relation of Agriculture to other industries and to national prosperity; influences which should determine the class of farming to be adopted; comparisons of special and general systems; uniting of manufacturing with farming; culture of the various farm crops—cereals, grasses, etc.; farm accounts.

History of Agriculture.—Progress and present condition in this and in other countries. Influence of climate, civilization, and legislation in advancing or retarding. Agricultural literature and organizations.

Rural Law.—Business law; laws especially affecting agriculture—tenures of real estate; road, fence, drainage laws, etc.

HORTICULTURE.

Elements of Horticulture.—The following topics are discussed: Orchard sites; the age of trees to plant; the season to plant; how to plant; what to plant; the management of the soil; pruning and care of trees; gathering and preserving fruit; disease and injuries; the nursery; ornamental trees and shrubs; flower gardens; vegetable gardens, including propagating beds and houses; the vineyard and small fruits, and timber tree plantation. Students have instruction and practice in grafting, budding, propagation by cuttings, etc. Each student has usually grafted from two hundred to one thousand root grafts of apples.

Landscape Gardening.—Lectures are given upon the general principles of the art, the history and the styles, the kinds and uses of trees, shrubs, grass, and flowers, the introduction and management of water, the construction and laying out of drives and walks, fences, buildings, etc. The class draw first from copy, then, after the actual study of some locality with its environments, design and draw full plans for its improvement, indicating positions of all prominent objects including the kinds and groups of trees and other plants. These plans, with specifications, are to be deposited in the library of the school. Excursions are made when found practicable, for the study of public and private grounds.

The three following studies constitute a year's work designed for those who wish to prepare themselves for special horticultural pursuits, and may be taken as substitutes for agricultural or veterinary studies:

Floriculture.—The study of the kinds, propagation, growth and care of flowering and other ornamental plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatments. Insects and diseases, with the remedies, are thoroughly treated, and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice.

Pomology and Forestry.—Much of the first half of the term is spent in the orchards, nurseries, and forests, making observations and collections, and in laboratory work, determining species, varieties, etc. A large collection of apples, pears, grapes, peaches, etc., is made each year, and the chief characteristics of each pointed out. Practice is had in making drawings and plaster casts. Written descriptions of the fruits are carefully made and compared with those given in the books, and systems of analysis and classification are put to practical tests. Students see and perform the skilled operations usually practiced in the propagation and growth of trees. Various methods of pruning and training, especially of grapes, are discussed in the class-room. and illustrated upon the grounds. Students study the injurious insects and fungi which cause or accompany diseases of trees and fruits, and the methods of preventing or diminishing their ravages. The native forests of the vicinity and of the country at large are studied as a foundation for the lessons upon the influence and value of timber and other trees, and their artificial culture. For the latter. the forest tree plantation on the University grounds. and the aboretum, afford practical illustrations.

Plant-Houses and Management.—This study includes gardening and landscape architecture, the methods of construction, heating and ventilation, and general management, so as to secure. under the different circumstances, the best plant growth. The class-room work consists of lectures and architectural designing and drawing. Illustration and practice are afforded by the plant-houses of the University.

VETERINARY SCIENCE.

This science is taught during the third year. In the first term the Anatomy and Physiology of the domestic animals are taught by lectures. demonstrations, and dissections. Post-mortems of healthy and of diseased animals are made, so that the students may become practically acquainted with the tissues in health and in disease. The second term is devoted to the study of Veterinary Medicines, their action and uses: and to lectures on the principles and practice of Veterinary Science. During the entire year practical instruction is given in clinical work, as cases present themselves, at the Veterinary Infirmary, where animals are treated or operated on, free

of charge, for the instruction of the students. Lectures are given on Veterinary Sanitary Science and the Principles and Practice of Veterinary Surgery.

Students desiring to pursue the study of Veterinary Science further than is laid down in the agricultural course, will find ample facilities for so doing.

LABORATORY WORK.

Experiments and special investigations by each student. A Thesis is required, embodying the results of original observation and research.

For details as to the study or Botany, Chemistry, Zoology, Entomology, Geology, and Meteorology, see statements in *College of Natural Science.*

APPARATUS.

The College has for the illustration of practical agriculture, a Stock Farm of 400 acres, provided with a large stock-barn fitted up with stables, pens, yards, etc.; also an Experimental Farm of 180 acres, furnished with all necessary apparatus to illustrate the problems of breeding and feeding. It has fine specimens of neat cattle, Short-Horns, Herefords, Holsteins, and Jerseys; Berkshire and Poland-China Swine; and Shropshiredown, Southdown, and Cotswold Sheep. The experimental Department exhibits field experiments, in the testing of the different varieties and modes of culture of field crops, and in the comparison and treatment of soils. It includes experiments in agriculture and horticulture, under the direction of the Professors of Agriculture and Horticulture, and experiments in feeding animals of different ages and development, upon the various kinds of food. In common with similar departments in the several Agricultural Colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science.

The barn on the Stock Farm has north and west fronts of 80 feet each. Each limb, or L, is 40 feet wide. It is of the kind known as the hill-side barn. The barn on the Experimental Farm is of less size, but is fitted up with great convenience, and is supplied with a large windmill which furnishes power for grinding feed, and for other purposes.

A veterinary hall and stable have been provided, and a clinic is held to illustrate the lectures on veterinary science. The department has Dr. Auzoux's celebrated complete model of the horse in 97 pieces, exhibiting 3,000 details of structure; also *papier mache* models of the foot and the teeth of the horse at different ages.

Surveying and drainage are illustrated by field practice, with instruments and by models. Agricultural Chemistry is pursued in connection with laboratory practice, in the analysis of soils, fertilizers, foods, etc. The College has fine collections of soils, seeds, plants, implements, skeletons of domestic animals, charts, and other apparatus, including a large number of models of agricultural machinery.

Upon the grounds devoted to the use of the College there are:

1. A very large specimen apple orchard, planted in 1869, and originally containing about 1,000 varieties—many varieties of pears, cherries, grapes, and small fruits.

2. A nursery of young trees, in which students have regular work in propagation, etc.

3. A forest tree plantation, embracing the most useful kinds of timber.

4. An arboretum in which all hardy indigenous and exotic trees are planted as fast as they can be secured, and which now contains nearly 100 varieties. The ornamental grounds which surround the University building embrace about twenty acres, and are kept in neat and attractive style. These, with all the adjuncts of trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks of different materials and styles of laying out, give illustration to the class-room work in landscape gardening. A green-house contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in green-house management.

The cabinet contains a series of colored plaster-casts of fruits prepared at the University; *modeles elastiques* of fruits and flowers by Auzoux of Paris; collections of seeds of native and exotic plants; of specimens of native and foreign woods; of beneficial and injurious insects, and specimens showing their work; numerous dry and alcoholic specimens and preparations; maps, charts, diagrams, drawings, etc.

The College has a supply of compound microscopes and apparatus, and students have opportunity to learn their use, and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungous parasites which cause disease to cultivated crops.

AGRICULTURAL COURSE.

Required for the Degree of B. S., in College of Agriculture.

FIRST YEAR.

1. Elements of Agriculture; Chemistry; Trigonometry; Shop practice (optional).
2. Elements of Horticulture; Chemistry; American Authors, or Free Hand Drawing.
3. Economic Entomology; Chemistry; British Authors.

SECOND YEAR.

1. Chemistry and Laboratory Practice; Botany; German.
2. Agricultural Chemistry (Soils and Plants); Zoology or Botany; German.
3. Agricultural Chemistry (Tillage, Fertilizers, Foods); Vegetable Physiology; German.

THIRD YEAR.

1. Agricultural Engineering and Architecture; Animal Anatomy and Physiology; German.
2. Animal Husbandry; Veterinary Science; Veterinary Materia Medica (optional extra); Physics or Geology.
3. Landscape Gardening; Veterinary Science; Physics or Geology.

FOURTH YEAR.

1. Physiography; Mental Science; History of Civilization.
2. Rural Economy; Constitutional History; Logic.
3. History of Agriculture and Rural Law; Political Economy; Laboratory Work.

N. B.—Students in Horticulture will take the special branches in Horticulture described on pages 36 and 37.

Students who have not the time necessary for the full course, and yet desire better to fit themselves to be successful farmers, may give exclusive attention to the technical Agricultural studies, including Veterinary Science, and complete these in one year.

The studies of the second, or winter term of this course, are arranged so as to be profitably studied by those who can be in attendance only during that term.

Students will be admitted to this course on passing a satisfactory examination in the common school branches, but they will receive greater benefit from it if they have made better preparation, especially if they have a good knowledge of Botany and Chemistry. They should not be less than eighteen years of age. Special fee $5 per term.

The studies are taught in the following order:

1. Elements of Agriculture; Agricultural Engineering and Architecture; Animal Anatomy and Physiology; Shop Practice.
2. Animal Husbandry; Rural Economy; Veterinary Science.
3. History of Agriculture and Rural Law; Veterinary Science; Economic Entomology or Landscape Gardening.

College of Engineering.

SCHOOLS.

MECHANICAL ENGINEERING; CIVIL ENGINEERING;
MINING ENGINEERING; ARCHITECTURE.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, Ph. D., LL. D., REGENT; Mechanical Engineering.
N. CLIFFORD RICKER, M. Arch., *Dean;* Architecture.
SAMUEL W. SHATTUCK, A. M., C. E., Mathematics.
EDWARD SNYDER, A. M., Modern Languages.
JAMES D. CRAWFORD, A. M., History.
PETER ROOS, Industrial Art and Design.
IRA O. BAKFR, C. E., Civil Engineering.
WILLIAM McMURTRIE, E. M., Ph. D., Chemistry.
THEODORE B. COMSTOCK, Sc. D., Mining Engineering.
JAMES H. BROWNLEE, M. A., Rhetorie and Oratory.
CHARLES W. ROLFE, M. S., Geology.
HERBERT H. SARGENT, Lt. U. S. A., Military Science.
ARTHUR T. WOODS, Asst. Eng., U. S. N., Mechanical Engineering.
ARTHUR N. TALBOT, C. E., Engineering and Mathematics.
EDWIN A. KIMBALL, Iron Work.
GEORGE W. PARKER, Wood Work.

ADMISSION.

Applicants should be at least eighteen years of age. None are admitted under fifteen. The requirements for admisssion embrace the common school branches and the studies of the preliminary year. The examinations in Mathematics are especially thorough.

Those who make further preperation than that required before entering can make their course more extensive and profitable. The following suggestions are offered to such as wish to make thorough work:

Either French er German are studied during two years; some preparation in Latin will be of great assistance in these languages. The engineer and architect should be adepts in the various departments of drawing and some previous study of this branch will be of great advantage. "Warren's Draughting Instruments" may be used as a text book, and the drawings made on smooth paper, eight by ten inches.

STUDIES PURSUED BY ALL ENGINEERING STUDENTS.

The subjects common to all the schools in the College of engineering will be described first ; the topics peculiar to each will be noticed under their specific names.

PURE MATHEMATICS, FIRST YEAR.

Trigonometry.—Plain and spherical. Fundamental relations between trigonometrical functions of an angle or arcs; construction and use of tables; solution of triangles; projection of spherical triangles; angles as functions of sides and sides as functions of angles; general formulas; applications.

Analytical Geometry.—The point and right line in a plane; conic sections, their equations and properties; the tangent and subtangent; normal and subnormal, pole and polar, supplementary chords, conjugate diameters, etc. Discussion of the general equation of the second degree containingtwo variables.

Advanced Algebra.—Functions and their notation; series and the theory of limits; .imaginary quantities; general theory of equations.

PURE MATHEMATICS, SECOND YEAR.

Differential Calculus.—Rules for the differentiation of functions of a single variable; successive differentiation; de-

velopment of functions; maxima and minima of functions of a single variable; differentials of an arc, plane area, surface and volume of revolution; elementary discussion of higher plane curves; the spirals, logarithmic curve, trochoid. etc.; algebraic curves.

Integral Calculus.—Integration of elementary forms and rational fractions; rectification of plane curves; quadrature of plane areas and surfaces of revolution; cubature of solids of revolution.

Advanced Analytical Geometry.—Loci in space; in point. right line, plane, and surfaces of the second order.

Advanced Calculus.—Development of the second state of functions of any number of variables; differental equations; maxima and minima of functions of two or more variables; construction and discussion of curves and surfaces; integration of irrational and transcendental differentials and of differential equations of the higher orders and degrees; applications; elements of elliptic integrals.

PHYSICS.

The course of Physics embraces the kinds of work following:

1. Recitations, five exercises a week, in which a text book is used as a guide.

2. Experiments in Physical Laboratory one day each week, in which the student uses the instruments in testing the principles taught.

3. Illustrated experiments once each week, in which the more costly apparatus is used before the whole class, in such experiments as are difficult to perform, and which are more effective when prepared for an audience.

4. Higher physical experiments by advanced classes, consisting either of researches, or of reviews of careful and elaborate experiments previously worked up by others.

The Department of Physics is provided with illustrative apparatus for use in the lecture-room, and with an extensive Physical Laboratory. The collection of instruments embraces acoustic apparatus from R. Koenig, of Paris; apparatus for heat and molecular physics from J. Salleron, of Paris; for light, optics, and electricity from Stoehrer, of Leipsic, and Browning and Newton, of London; pneumatic and elec-

trical apparatus from E. S. Ritchie, of Boston; and a large number of pieces prepared at the mechanical shops of the University. It includes, also, Browning's electric lamp; and from Eliot Brothers, London, resistance coils, galvanometers, etc., for higher researchers in electricity.

A large dynamo, for experimental purposes, has lately been placed in the machine shops and is connected with the laboratory. Other electrical apparatus will be added during the present season.

DRAWING.

Projection Drawing.—Use of instruments in applying the elements of description geometry; use of water colors; isometrical drawing; shades and shadows; perspective; drawing of machines, bridges, roofs, etc., finished by line shading, tints, and colors.

Free Hand Drawing.—Outline sketches; drawing from casts; sketches of machines, etc.

Lettering.—Plain and ornamental alphabets; titles and title pages; round and stump writing.

Descriptive Geometry.—Problems on the point, right line, and plane; warped surfaces, perspective; shades and shadows; practical problems.

APPLIED MATHEMATICS.

Analytical Mechanics.—Polygon of forces; equations of equilibrium of moments; center of gravity; moment of inertia; acceleration, work, momentum, impact; motion of free particles; central forces; constrained motion.

Strength of Materials.—Elasticity; safe limits; shearing stress; flexure and strength of beams and columns; practical formulas.

Hydraulics.—Amount of and center of pressure upon submerged surfaces; flow of liquids through orifices, weirs, pipes, and channels; distribution of water in cities.

THESES.

In all the schools in this College a thesis is required as a condition of graduation. It must be an original composition of suitable length, upon a subject appropriate to the school, and approved by the Professor in charge. It must be illustrated with such photograps, drawings, and sketches as may be needed, and embellished with a title page neatly lettered with India ink or colors. It must be upon regulation paper,

and securely bound. It will be prepared during the latter part of the fourth year, and presented at the close of the course, after which it will be deposited in the library of the Uniuersity.

CONTRIBUTIONS.

Our friends and students are invited to send us specimens of material and manufactures, and drawings, models, or photographs of machinery, bridges, and other engineering and architictural works. Finished and detailed working drarwings, perhaps otherwise useless, may be of great value for instructions. Illustrated circulars and price lists of manufacturing firms are desired. Contributions will be labelled with donors' names, and placed in the Museum of Industrial Arts for the inspection of students and the illustration of lectures.

SCHOOL OF MECHANICAL ENGINEERING.

OBJECT OF THE SCHOOL.

This school seeks to prepare students for the profession of Mechanical Engineering. It aims to fit them to invent, design, construct, and manage machinery for any branch of manufactures. The state needs men who, to a thorough knowledge of the principles of machinery and of the various motors,add the practical skill necessary to design and construct the machines by which these motors are made to do works.

INSTRUCTION.

The instruction, while severely scientific, is thoroughly practical. It aims at a clear understanding and mastery of all mechanical principles and devices. Practice in the Mechanical Laboratory is counted as one of the studies of the course.

In *principles* instruction is imparted by lectures, illustrated plates, and by text books. Examples are given, showing the application of the theories and principles taught. Experiments in the testing of machines and motors are undertaken by the student.

In *practice* elementary forms are produced and projects are executed, in which the student constructs machines, or parts thereof, of his own designing, and from his own working drawings.

In *designing* the student begins with elements, and proceeds with progressive exercises till he is able to design and represent complete machines.

MECHANICAL ART AND DESIGN.

An elementary course of shop practice has been carefully arranged, to familiarize the student with the forms of the parts of machines, and the mode of producing them. He is made familiar with all the ordinary cutting tools for iron or wood; with the form and condition for most effective work; with the machines and appliances by which they are put in action, and the instruments by which desired dimensions of product are obtained. This practice is obtained in the Mechanical Laboratory, and represents five different shops, viz.:

1—PATTERN MAKING.
2—BLACKSMITHING.
3—FOUNDRY WORK.
4—BENCH WORK FOR IRON.
5—MACHINE TOOL WORK FOR IRON.

In the 1st, the practice consists in planing, turning, chiseling, etc., in producing true surfaces in various forms in wood, and also in combining pieces by glue joint, etc., preliminary to correct pattern making. Patterns are finally made from which are cast pieces in iron, brass, etc., to be worked in the subsequent shops.

In the 2d, the student uses the forge and performs the various elementary operations, such as drawing, upsetting, bending, welding, etc.

In the 3d, the process of moulding and casting are fully illustrated.

In the 4th, there is first a course of free-hand bench work, the cold chisel and file being the only tools. After the hand and eye are sufficiently trained, fitting is begun, and the square, bevel, rule, compasses, and other auxiliary bench tools are used. Pieces are then fitted together by the file, with surfaces carefully finished.

In the 5th shop, the ordinary machine tools of the machine shop are used. The first practice employs these machines with their cutting tools or bits, in common operations, such as turning cylinders, discs, grooves, and fillets; boring, drilling, hand-turning, milling, planing, etc. Fol-

lowing this is a course of practice in fitting and finishing, in which calipers, rules, etc., are introduced, and many of the various fittings employed in machinery are produced.

Previous to the shop work, drawings of the pieces are made by the student, and the exact thing to be done is indicated; thus mistakes are avoided and practice facilitated.

The designing of such machine elements as pulleys, journal boxes, cranks, stuffing boxes, etc., cultivates a knowledge of proportion, and of its proper representation on paper. This course of elementary practice fits the student for the advanced shop practice in designing and construction of complete machines undertaken later in the course.

TECHNICAL STUDIES.

Kinematics and Principles of Mechanism.—Relative motion of points in a system of connected pieces; motion independent of force; velocity ratio; investigation of motion of elementary parts of machines, as friction and non-circular wheels in rolling contact, cams and curves in sliding cantact; gear teeth; gearing chains; escapements; link work.

Prime Movers.—The theory and useful effects of turbine water wheels, and best form of the parts for high effieiency. Other water wheels and wind wheels. Application of thermodyamics in the study of best engines. Relative economy of different engines.

Mill Work and Machinery.—Trains of mechanism studied with reference to their resistance and efficiency; best forms for transmission of power for short or great distances; forms of the parts for securing desired results in power and velocity; elastic and ultimate strength of parts.

Machine Drawing.—Working drawings of original designs; finishing in water colors, and in line shading; details for shop use, according to the practice of leading manufactures.

PROJECTS AND PRACTICE.

The shop practice of the first year has already been described. The second year practice will have for its object the production of some model or machine. The students, under the immediate direction of the teachers, carefully determine the dimensions and shapes best suited for the parts of some machine, produce them in neat and accurate working drawings, and make tracings for shop use. No student will

commence his advanced shop practice without working drawings. The designs are such as require execution in iron, brass, and wood, for the purpose of giving variety of practice. The student is required to make the patterns and castings, finish the parts, and put them together in accordance with the working drawings and the required standard of workmanship. This acquaints him with the manner in which the mechanical engineer carries his design into execution, and teaches him so to shape, porportion, and dispose the parts of a machine as to secure the greatest economy of construction and durability in use. The practice of the third year will include the careful construction of mechanical movements, strictly in accordance with the theoretical determination of the form of the parts.

The steam engine, large drill press, one engine lathe, the hand lathes, and the milling machine, now in use, were designed here, and built in the shop by students in the department.

Besides these practical exercises, students of sufficient skill may be employed in the commercial work which is undertaken by the shop. For this work they receive compensation. This work includes all kinds of machine building and repairing, and will serve to extend and confirm the practical experience of the student.

Experiments and Practical Problems.—Experiments in the testing of prime movers and other machines, are undertaken by the students. They take indicator diagrams from the engine of the Mechanical Laboratories, and in factories in the adjoining towns, and determine from them the power developed with different degrees of expansion, and the possible defects of valve movement in distribution of steam.

APPARATUS.

This school is provided with plates and a cabinet of models illustrating mechanical movements and elementary combinations of mechanism. This collection is rapidly increasing by our own manufacture, and by purchase from abroad. It includes many of Riggs' models, and others from the celebrated manufactory of J. Schrœder, of Darmstadt, Germany. About two hundred valuable models from the United States Patent Office are also included in the cabinet.

The State has provided a large Mechanical Laboratory and Workshop, furnished with complete sets of tools, benches, vices, and forges, with flasks for moulding in sand, and cupola for melting iron.

STUDIES.

The studies are given by the year and term in the tabular view of the course. The order there indicated should be closely followed, that the student may avoid interference of his hours of recitation.

MECHANICAL ENGINEERING COURSE.

Required for the Degree of B. S. in School of Mechanical Engineering.

FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; German or French.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; German or French.
3. Advanced Algebra; Free Hand Drawing; Shop Practice; German or French.

SECOND YEAR.

1. Calculus; Designing and Construction of Machines; German or French.
2. Advanced Analytical Geometry; Designing and Construction of Machines; German or French.
3. Advanced Calculus; Engineering Materials; German or French.

THIRD YEAR.

1. Mechanism; Analytical Mechanics; Chemistry.
2. Physics; Resistance of Materials; Chemistry.
3. Physics; Advanced Descriptive Geometry; Astronomy.

FOURTH YEAR.

1. Prime Movers; Construction Drawing; Mental Science.
2. Prime Movers; Construction Drawing; Constitutional History.
3. Mill Work; Designing and Laboratory Practice; Political Economy

In this course the student will take two years of either French or German, but not one year of each.

SCHOOL OF CIVIL ENGINEERING.

OBJECTS OF THE SCHOOL.

The school is designed to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

INSTRUCTION.

The student should lay a broad foundation in general culture, which will enable him to pursue his professional studies with greater ease and advantage. With this view the subjects peculiar to civil engineering are not introduced until the second year.

The instruction is given by lectures, text books, and reading, to which are added numerous problems and practical exercises, as serving best to explain subjects completely and fix them in mind. Models and instruments are continually used, both in lectures and by the students themselves.

COURSE OF STUDIES.

The complete course occupies four years. The studies of the first three years will prepare students for undertaking many engineering operations, such as making land and topo graphical surveys, building railroads, canals, embankments, etc. The fourth year is intended to fit ihem for higher engineering operations, such as making geodetic surveys, building arches, trussed bridges, and supporting frames of all kinds.

The order of studies as given by the year and term in the tabular view of the course, should be closely followed so that the student may avoid interference of hours of recitation, and because the studies are there given in the order which best meets the preparation of the student.

TECHNICAL STUDIES.

Astronomy. Descriptive Astronomy is given with a text book. The equatorial telescope is in constant use during favorable weather. Practical astronomy is given by lectures and practical work with the alt-azimuth instrument, the astronomical transit, the sextant, and the engineer's transit adapted to astronomical calculations. It includes the instruments and their adjustment, the determination of time, latitude, longitude, and azimuth.

Bridges.—Calculation of trusses in the various forms of bridge trusses, by algebraic and graphical methods. consideration being given to weights of bridge and train, and force of wind; designing trusses and proportioning sections: details.

Geodesy.—Spirit, barometrical, and trigonometrical leveling; base lines, stations. and triangulation; parallels and meridians; projection of maps.

Land Surveying.—Areas and distances, by chain, compass, and plane table; omissions and corrections; metrical system; methods of U. S. public lands surveys; magnetic variations; determination of true meridian.

Railroad Surveying.—Economic location; curves and grades, and their inter-adjustment; earth work; curvature and elevation of rail; easement curves; turnouts; crossings: maintenance of way.

Stone Work.—Stone, brick, lime, mortar, cement; foundations; retaining walls; arches, etc.

Topography.—Use of stadia, plane table, and level; contours; soundings. Sketching, mapping, conventional signs; city and country maps.

Theory of Engineering Instruments.—Examination of workmanship and design; testing instrument maker's adjustments; engineer's adjustments; determination of areas with transit; inaccessible and air line distances; profiles; heights and distances with stadia; measurement of angles with sextant, etc.

PRACTICE.

In the fall term of the second year, the class will solve numerous problems in distances, areas, etc., using the chain, compass, and plane table. During the winter term the student will have practice with all the engineering instruments. and solve problems with the transit, stadia, level, and sextant. In the spring term the class makes a careful topographical survey of a locality, using the stadia and plane table as in the United States surveys.

In the fall term of the third year the class will execute a project in railroad engineering. which will consist of preliminary surveys, location, staking out, drawings, computations of earth work, etc. The preliminary survey will consist in an examination of the locality, and in running tangent

lines, with leveling and topographical sketching. The location will consist in running the line over the route decided upon, with all the necessary measurements and calculations for establishing the grade, setting slope stakes, etc. The drawings will include alignment, profile, plans, etc.

A project in geodesy or higher engineering will be executed during the fall term of the senior year. During this term the students have exercises in practical astronomy.

APPARATUS.

For Field Practice.—The school is well provided with the instruments necessary for the different branches of engineering field practice, which include chains, tape, compass, plane table, stadias, transits, levels, barometer for barometrical leveling, base rods and comparing apparatus, sextants, engineer's transits arranged for astronomical observation. An astronomical observatory is provided with an equatoral telescope, an astronomical transit, with attachment for zenith telescope work, a chronometer, and a set of meteorological instruments.

A portable altitude and azimuth instrument of the latest and best form, from the celebrated makers, Troughton & Simms, of London, is used for instruction in Geodesy and Practical Astronomy. It is read by micrometer microscopes to single seconds, both of altitude and of azimuth.

To facilitate practice in trigonometrical and land surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them.

For the Lecture Room.—The school has numerous models for illustrating its specialties, including descriptive geometry and astronomy; models of bridges, roofs, joints, and connections; a large collection of drawings, photographs, and photolithographs of bridges, roofs, and engineering structures; it has access to the Museum of Industrial Arts, which contains models illustrating wood, stone, and metal construction, and to a complete set of lithographs of the lectures and drawings used in the government Polytechnic Schools of France.

The Library is well supplied with the latest and best periodicals and books upon engineering subjects.

CIVIL ENGINEERING COURSE.

Required for Degree of B. S., in School of Civil Engineering.

FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; French or German.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; French or German.
3. Advanced Algebra; Free-Hand Drawing; Shop Practice; French or German.

SECOND YEAR.

1. Calculus; Land Surveying; French or German.
2. Advanced Analytical Geometry; Surveying and Theory of Instruments; French or German.
3. Advanced Calculus; Topographical Surveying and Drawing; French or German.

THIRD YEAR.

1. Analytical Mechanics; Chemistry; Railroad Engineering.
2. Resistance of Materials; Chemistry; Physics.
3. Advanced Descriptive Geometry; Astronomy; Physics.

FOURTH YEAR.

1. Mine Attack; Geodesy and Practical Astronomy; Mental Science.
2. Bridges; Stone Work; Constitutional History.
3. Geology; Bridge Construction; Political Economy.

In this course the student will take two years of German or French, but not one year of each.

GEOGRAPHICAL POSITION OF THE UNIVERSITY.

The Observatory has the following position:
Latitude, 40° 6′ 29″.66.
Longitude, west of Washington, 11° 10′ 37″.5, or 44m. 42.5s.
Elevation above sea level, 720 feet.

SCHOOL OF MINING ENGINEERING.

OBJECT OF THE SCHOOL.

The school has been established to meet the growing demand of a very important industry for thoroughly trained engineers, fitted to solve the numerous perplexing problems which are constantly arising in all mining work. The subjects of the discovery, opening, economical working and proper ventilation of mines, the prevention of accidents,

transportation above and below ground, treatment of products, with many others which fall within the scope of the mining engineer, can be mastered only by a careful study of facts and principles. This is the proper foundation for the practical work of the profession, and it is the aim of this school to present this in the most complete and thorough manner.

INSTRUCTION.

It is important that a broad basis be laid by way of general preparation for the more technical studies here included. Whatever of general culture the student may obtain before entering the University, will not come amiss, and, although the requirement is not made, it is advised that all who can do so should acquire a reading knowledge of French or German before beginning this course.

The course comprises the greater part of the pure and applied mathematics of the course in Mechanical and Civil Engineering. Much time is devoted to Chemistry and Geology, with the addition of metallurgy and other technical studies peculiar to mining engineering.

Students who are graduated from this school are not supposed to be familiar with all the details of mine management from actual experience, but they will have obtained such a knowledge of the principles underlying all successful practice, and such a familiarity with the science of mining in all its branches, that the art may be acquired with the minimum of practice.

Lectures are given when desirable, but these are to be regarded as supplementary to other modes of instruction which are made to conform as closely as possible to the routine of the engineer in practice. In every detail the student is made to feel that he is dealing with the actual problems which he will meet in his professional work.

Plans, estimates, drawings, reports, and calculations, based upon data obtained in the student's own experience, are constantly required, and no pains is spared to familiarize each member of the class with the duties and responsibilities of every grade, from miner to manager.

COURSE OF STUDIES.

In the first two years the work is similar to that required in the course in Civil Engineering, but more time is given to

chemistry. In the third year geology and Mining Engineering, with assaying and metallurgy, take the places of special technical studies in the other engineering courses. In the fourth year, with the exception of two terms of Prime Movers taken with the students in Mechanical Engineering, and some studies of general character, the work is strictly technical.

TECHNICAL STUDIES.

Mine Surveying and Reconnoitering.—History, uses, and adjustments of instruments; solar compass and various solar attachments; practical problems involving the running of surface lines and lines under ground; connecting of surface and underground surveys; practice of U. S. deputy surveyors. Details of mine surveys, setting of bench works; lines through shafts, drifts, slopes, etc.; keeping of records, plans, etc. Surveys required to determine best locations for test borings, shafts, adits, etc.; methods of reconnoitering.

Mining Engineering.—1 Attack.—Tools, implements, machinery, and explosives, with principles governing their use. Methods of boring, sinking, and driving through hard, soft, wet, dry, loose, or compact material.

2. *Timbering.*—Objects, methods, etc.; framing, fitting, bracing.

3. *Transportation.*—Underground haulage, hoisting, use of chutes; apparatus and appliances, cars, tracks, switches, cables, cages, motive power, connections; haulage in inclines, "man-engines," etc.

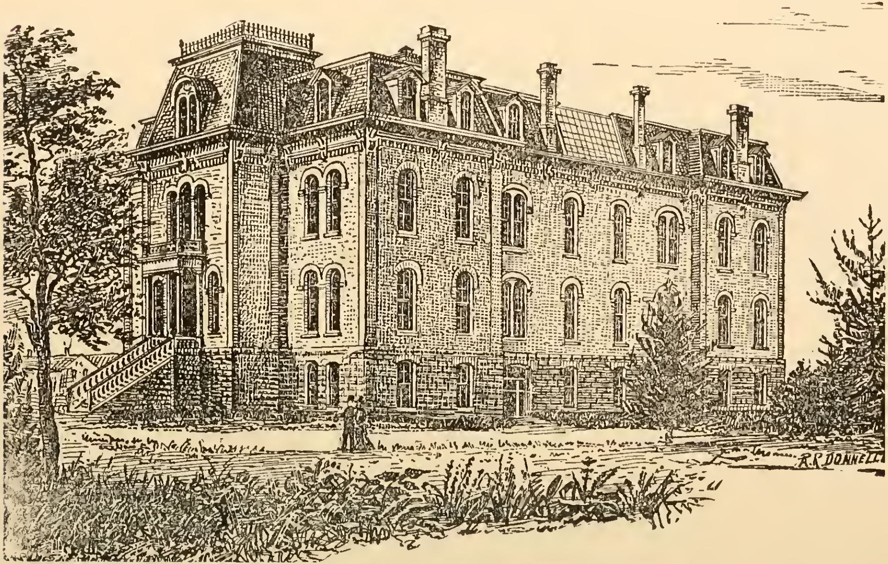
4. *Drainage.*—Pumps, pumping, sumps, ditches; drainage of working shafts and inclines.

5. *Ventilation.*—Means and appliances. Importance of subject; laws of various states and countries. Discussion of fundamental principles and practical applications, with results.

6. *Buildings and Machinery.*—Hoisting apparatus, air compressors, power drills, etc.

7. *Exploration.*—To determine general character and extent of deposits in advance of development; methods and aims.

8. *Development.*—Blocking out of deposits to prove values of partly explored ground, and to prepare for further exploration.



CHEMICAL LABORATORY.

Exploitation.—Laying out work; trimming of coal, ore, etc.; stoping, overhand and underhand; winzes and intermediate levels; economical handling of product. Methods to be employed under various conditions.

Dislocations.—Faults, upthrows, downthrows, feeders, leaders, rolls, swells, etc. Means of overcoming difficulties.

Dressing of Products.—Coal screening and washing; sampling and grading ore; assorting, crushing, spalling, cobbing; concentrating.

Mining Machinery.—Elements of construction, designing of plant, combination of parts; setting, arranging, adjusting. Preservation and operation, general economy.

Organization.—Economy of management. Secondary superintendence; division of labor and adjustment of responsibility. Prevention of accidents.

Administration.—Review of principles. System of reports from sub-officers and tabulation of records. Accounts, forms, analysis, pay-rolls, cost sheets, etc. Letting and measuring contracts. Miscellaneous details.

Engineering Geology.—Applications of geology to engineering and mining. Nature and distribution of deposits of economic value, as coal, water, metalic ores, etc.; advanced structural geology and lithology; discussion of principles underlying successful working of mines, placing of foundations, setting of machinery and erection of structures in various situations, Relation of geological structure to drainage, economy of working, selection of points of attack, methods of exploration, etc.

APPARATUS.

The department has a valuable collection of models of mining and metallurgical machinery, and new material will be added as fast as the development of the school will require, and the funds furnished will permit.

The extensive apparatus and collections in other departments are available, and these comprise a large amount of material which is useful for this purpose.

COURSE IN MINING ENGINEERING.

Required for the Degree of B. S. in School of Mining Engineering.

FRESHMAN YEAR.

1. Trigonometry: Projection Drawing; Chemistry; French or German.
2. Analytical Geometry: Descriptive Geometry and Lettering; Chemistry; French or German.
3. Advanced Algebra; Free-Hand Drawing; Chemistry; French or German.

SOPHOMORE YEAR.

1. Land Surveying; Calculus; Chemistry.
2. Theory of Instruments; Advanced Analytical Geometry; Physics.
3. Topographical Surveying; Advanced Calculus; Physics.

JUNIOR YEAR.

1. Mine Attack; Analytical Mechanics; Mineralogy
2. Geology; Resistance of Materials; Assaying.
3. Geology; Mining Surveying; Metallurgy.

SENIOR YEAR.

1. Mining Engineering; Prime Movers; Mental Science.
2. Engineering Geology; Prime Movers; Constitutional History.
3. Mining Engineering; Mine Administration; Political Economy.

SCHOOL OF ARCHITECTURE.

OBJECT OF THE SCHOOL.

The school prepares students for the profession of Architecture. For this a thorough knowledge of scientific principles applied to building, ability and correct taste in design, and a technical knowledge of the various building trades, with skill in the use of tools, are necessary, and are prominent objects of the course of instruction.

The course embraces the knowledge of theory and principles of construction details and of the ordinary routine work of office practice, so far as these can be tuught in a technical school. Tne technical instruction is given chiefly by lectures, with reference to text books, and is illustrated by sketches, engravings, photographs, and models; practical applications are immediately made by students.

Drawing is practiced throughout the course, and, as far as possible, original work is executed. Drawing from casts and modeling in clay give facility in sketching details and correct knowledge of form.

In shop practice, joints in carpentry and joinery, cabinet making, turning, metal and stone work, are executed; also models at reduced scale of roof and bridge trusses, ceilings, domes, and stairs.

TECHNICAL STUDIES.

Elements of Drawing.—Lectures; designs, for specified problems; outline sketches and finished drawings from casts in pencil, crayon, and charcoal.

Wood Construction.—Frames, roofs, ceilings, domes, heavy frames for mills, etc., roof trusses, stairs, doors, windows, external and internal finish.

Stone Construction.—Materials, mortars and cements, walls, foundations, stone cutting, tools and modes of using.

Brick Construction.—Materials, bonds, walls, arches, vaults and domes, centerings, etc.

Iron Construction.—Uses and strength of cast and wrought iron and steel; usual forms and formulæ for columns, lintels, girders, and beams.

Tinner's Work, Slating, and Plastering.

Sanitary Construction.—Scientific principles and practical methods employed in plumbing, water supply, and drainage of buildings.

Architectural Drawing.—Finishing in line, ink, sepia, and color; working out from sketches full sets of drawings for buildings; practical perspective; shades and shadows.

Architectural Designing.—Original sketches for specific projects; one full set of drawings for buildings for specified private or public purpose.

History of Architecture.—Daily lectures and recitations on principal styles, their characteristics, construction, and decoration, making especially prominent those ideas applicable in American architecture; tracing of details; designs for special problems.

Esthetics of Architecture.—Esthetics applied to architecture and allied arts, so far as yet made practical; laying out of grounds, arrangement of plans, grouping of masses; decoration, internal and external; treatment of floors, walls, ceilings; art objects, furniture, carpets, etc. About twenty-five original designs for special objects.

Estimates.—Methods of measurement; cost of labor and materials; estimates for specified works.

Agreements and Specifications.—Preparation of sets.

Heating and Ventilation.—Usual methods, by grates, stoves, furnaces, hot water or steam apparatus; fuels, their properties, heating value, and products. Problems and applications to specified buildings.

Graphical Statics.—Elements; equilibrium polygon and its applications; roofs, loads, and wind pressures; type forms of trusses; determination of strains and dimensions of parts; details of joints; construction and use of graphical tables.

SPECIAL EXERCISES.

Specimen plates will be required of each student at the close of each term in drawing, to form a part of his record. All such plates must be on paper of regulation size, except when otherwise directed.

SHOP PRACTICE.

To give practical knowledge of various kinds of work, three terms are occupied in a course of instruction, which all architectural students are required to pursue unless they have already had equivalent practice.

First Term.—Carpentry and Joinery. Planing flat, square, and octagonal prisms, and cylinders; framing with single, double, and oblique tenons; splices, straight, and scarfed; miter, lap, and gained joints; through and lap dovetails; mouldings, miters, and panels.

Second Term.—Turning and cabinet making; cylinders, balusters, capitals and bases of columns, vases, rosettes, etc.; fret-sawing, plain and ornamental veneering; inlaying, carving and polishing.

Third Term.—Metal work, pattern making, moulding and casting, filing and finishing, drilling, screws, hand and machine turning.

Stone work designs executed in plaster of Paris; production of plane, rule, warped, and spherical surfaces; voussoirs of arches, vaults, and domes; decorative carving.

APPARATUS.

A collection of casts donated by the Spanish government, and another of casts of various architectural details from Lehr, of Berlin, belong to the school of Architecture and Designing; models of ceilings, roof trusses, stairs, joints, etc.; Schrœder's models of joints in stone cutting, etc.

The casts, photographs, etc., of the Art Gallery. In the library, many of the best English, German, French, and American architectural works and periodicals.

A large carpenter and cabinet shop, containing full sets of tools, for shop practice; foot and power lathes; cross and splitting saws; planer, moulder, tenoning machine, lathe, whittler, fret saw, etc.

ARCHITECTURAL COURSE.

Required for the Degree of B. S. in School of Architecture.

FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; French.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; French.
3. Advanced Algebra; Graphical Statics; Shop Practice; French.

SECOND YEAR.

1. Elements of Wood Construction; Calculus; Free Hand Drawing and Modeling.
2. Elements of Stone, Brick, and Metal Construction; Advanced Analytical Geometry; Architectural Drawing and Designing.
3. Elements of Sanitary Construction; Advanced Calculus; Water Color Sketching.

THIRD YEAR.

1. Architectural Drawing; Analytical Mechanics; Chemistry.
2. History of Architecture; Resistance of Materials; Physics.
3. History of Architecture; Advanced Descriptive Geometry; Physics.

FOURTH YEAR.

1. Esthetics of Architecture; Architectural Perspective; History of Civilization.
2. Architectural Designing; Heating and Ventilation; Constitutional History.
3. Architectural Designing; Estimates, Agreements, and Specifications; Political Economy.

BUILDER'S COURSE.

The Trustees allow persons desiring to fit themselves for master builders to take a course of a single year, pursuing such technical studies of the course in architecture as they may be prepared to enter upon with profit, and as will be most advantageous to them.

Candidates for the Builder's Course must pass the examinations in the common branches, but need not pass in

the studies of the preliminary year unless they shall desire to pursue other studies than those marked in the following schedule. Special fee, $5 per term

1. Wood Construction; Projection Drawing; Shop Practice (Carpentry and Joinery).
2. Stone, Brick, and Metal Construction; Architectural Drawing; Shop Practice (Stair Building).
3. Graphical Statics; Architectural Designing: Shop Practice (Cabinet Making).

College of Natural Science.

SCHOOLS.

CHEMISTRY. NATURAL HISTORY.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, Ph. D., LL. D., Regent.
WILLIAM McMURTRIE, E. M., Ph. D., *Dean*; Chemistry.
THOMAS J. BURRILL, M. A., Ph. D., Botany and Horticulture.
SAMUEL W. SHATTUCK, M. A., C. E., Mathematics.
EDWARD SNYDER, M. A., Modern Languages.
JAMES D. CRAWFORD, M. A. History.
PETER ROOS, Industrial Art.
STEPHEN A. FORBES, Ph. D., Entomology and Zoology.
JAMES H. BROWNLEE, M. A., Rhetoric and Oratory.
CHARLES W. ROLFE, M. S., Geology.
HERBERT H. SARGENT, Lt. U. S. A., Military Science.
ARTHUR W. PALMER, Sc. D., Asst. in Chemistry.
CHARLES B. GREENE, E. M., Asst. in Chemistry.
W. H. GARMAN, Asst. in Zoology.
CHARLES E. EGGERT, Ph. B., Instructor in French.

ADMISSION.

Candidates for the College of Natural Science must be at least fifteen years of age, and must pass satisfactory examinations in the common school branches, and in the studies of the preliminary year.

Their preparation should be especially good in the scientific studies of the preliminary year. Some practice in the drawing of natural objects will greatly facilitate the student's progress. A knowledge of the Latin language is a good preparation for the mastery of the scientific terms which must be learned in the course.

SCHOOL OF CHEMISTRY.

This School aims to impart such knowledge of Chemistry as will enable the student to apply the principles of the science to the related arts, and as will fit him for original research, or for the business of the druggist, pharmaceutist, and practical chemist.

INSTRUCTION.

The first term of the first year is occupied by text-book instruction, lectures, and experiments in the laboratory, illustrating the elementary principles of chemistry, chemical physics, and inorganic chemistry. The second term is devoted to laboratory practice in qualitative analysis. In the third term recitations upon organic chemistry and illustrative synthetic experiments alternate with laboratory practice in qualitative analysis. During the next three years each student is expected to work two hours daily in the laboratory five days in the week. In order to graduate, each is required, at the end of his course, to make an original investigation, and present a Thesis.

Students who pursue Chemistry as a part of other courses, work at least two consecutive hours daily during such time as their specialties may require.

Deposits.—At the beginning of each term of laboratory practice, each student will deposit twelve dollars with the business agent of the University. At the end of the term, the balance left, after deducting payment for gas, chemicals, and apparatus used, will be refunded.

Five courses of laboratory work have been arranged, as follows:

CHEMICAL COURSE.

FIRST YEAR.

First Term.—General, theoretical, and applied chemistry. Lectures. text-book, and experiments.

Second Term.—Qualitative analysis begun; tests and separation of the bases and acids.

Third Term.—Qualitative analysis completed. Examination of 20 simple salts and 20 compound substances, natural and commercial products. Organic chemistry. Text-book and recitations.

SECOND YEAR.

First Term.—Quantitative analysis of barium chloride, sodium phosphate, Rochelle salt, calcite, ammoniumferric sulphate. Volumetric analysis. Acidimetry and alkalimetry.

Second Term.—Quantitative analysis. Limestone, clay, spathic iron ore, calamine, copper pyrites, tetrahedrite. Volumetric analysis of iron, zinc, etc.

Third Term.—Advanced organic Chemistry. Ultimate organic analysis. Determination of carbon, hydrogen, nitrogen, chlorine, phosphorus, and sulphur, in carbon compounds.

THIRD YEAR.

First Term.—Advanced organic Chemistry, continued. Organic Synthesis and Analysis. Preparation of Carbon compounds, and determinations of compositions and formulas.

Second Term.—Assaying. Dry assay of gold, silver, lead, and tin ores. Volumetric assays of silver, lead, copper, and zinc ores, bullion. etc. Blow pipe assays of silver ores.

Third Term.—Analysis of Soil. Valuation of commercial fertilizers—phosphates, nitrogenous matter, and alkaline salts. Analysis of milk. butter, corn, and wheat. Examination of alcoholic liquors.

FOURTH YEAR.

First Term.—Gas Analysis. Calibration of eudiometers. Analysis of air from lungs, atmospheric air, marsh gas, crude coal gas. Analysis of mineral water. Preparations.

Second Term.—Toxicology. Micro-Chemistry of Poisons. Testing for mineral and vegetable poisons. Separation from organic mixtures. Preparations.

Third Term.—Original researches. Thesis.

PHARMACEUTICAL COURSE.

FIRST YEAR.

Same as in Chemical course throughout the year.

SECOND YEAR.

First Term.—Same as in Chemical course.

Second Term.—Quantitative analysis of commercial drugs, bismuth subnitrate, tartar emetic, sodium bicarbonate, potassium iodide, sodium bromide, ammonium carbonate, potassium nitrate, cream tartar. phosphites. Volumetric determination.

Third Term.—Same as in Chemical course.

THIRD YEAR.

Frst Term.—Same as in Chemical course.

Second Term.—Isolation and quantitative estimation of active proximate principles of vegetable drugs—oils, resins, gums, alkaloids, glucosides, etc.

Third Term.—Materia Medica. Reading and compounding prescriptions. Preparation aud valuation of tinctures and extracts. Examination of commercial organic drugs.

FOURTH YEAR.

First Term.—Analysis of urine, normal and pathological. Mineral waters. Examination of alcoholic liquors.

Second Term.—Toxicology. Micro-chemistry of Poisons. Separation of poisons from organic mixtures.

Third Term.—Original researches. Thesis.

COURSE IN AGRICULTURE CHEMISTRY.

Arranged for students desiring to make a specialty of this branch.

FIRST YEAR.

Same as in Chemical course.

SECOND YEAR.

First Term.—Quantitative analysis or barium chloride, magnesium sulphate, ammonium sulphate, calcium sulphate, dolomite, bone ash. kainit, feldspar.

Second Term.—Analysis of ashes of plants, soi', mineral water.

Third Term.—Analysis of commercial fertilizers, manures and mineral used for manures, apatite, phosphates, guanos, nitrates.

THIRD YEAR.

First Term.—Proximate analysis of farm products and cattle foods: corn, wheat, potatoes, hay, oil-cakes, etc.

Second Term.—Analysis of milk, butter, cheese. Analysis of sugars by polariscope and by titration. Examination of alcoholic liquors.

Third Term.—Original researches.

COURSE IN AGRICULTURAL CHEMISTRY.

Especially arranged for students in the School of Agriculture.

FIRST YEAR.

Same as in Chemical course.

SECOND YEAR.

First Term.—Same as in Chemical course.

Second Term. Analysis of soil, ashes of plants, commercial fertilizers, manures, and materials employed in their production apatite, phosphates, guanos, animal matters, ammonia salts, nitrates, and marls.

Third Term.—Analysis of corn, wheat, hay, milk, butter, and cheese.

METALLURGICAL COURSE.

FIRST YEAR.

Same as in Chemical course.

SECOND YEAR.

First Term.—Same as in Chemical course.

Second Term.—Assaying.* Same as in Chemical course.

Third Term.—Analysis of calamine, spathic iron ore, magnetic iron ore, copper pyrites, galena, nickel ore. manganese ore, cinnabar, grey antimony.

THIRD YEAR.

First Term.—Analysis of slags from copper, zinc, and lead; iron furnace and mill slags.

Second Term.—Analysis of pig iron, wrought iron, steel, commercial copper, lead, zinc, bullion.

Third Term.—Analysis of fuels, wood, anthracite and bituminous coals, coke, determination of heating power. Analysis of ashes and furnace cinders; mineral waters.

APPARATUS.

The facilities offered for obtaining a practical knowledge of Chemistry are believed to be unsurpassed by those of any other institution in the West. A large Laboratory Building, 75×120 feet, and four stories in height, has been erected at an expense, including furniture, of $40,000.

The basement contains a furnace room for assaying and metallurgical operation; a mill room for storing and crushing ores; and a large room for the manufacture of chemicals and pharmaceutical preparations.

The first story contains a lecture room capable of seating 200 persons, and a qualitative laboratory, which, when completed, will accommodate 152 students; one hundred and four desks are now fitted, each having an evaporating hood, gas, and water. There are a spectroscope table, a blow pipe table for general use, and a store room stocked with apparatus and chemicals.

The second story, designed for the use of advanced students, has the following apartments: A lecture room with mineralogical cabinet, and furnace models for illustrating lectures on metallurgy; laboratory for students in agricultural chemistry; large laboratory for quantitative analysis, now containing sixty-four desks; a balance room, containing chemical balances of the manufacture of Bunge (short

*Students who take this term's work must have had a term of Minerology.

beam), Becker & Son, Troemner: a pharmacy, furnished like a drug store with shelves, drawers, prescription desk, balance, graduates, etc., and containing a full set of drugs and pharmaceutical preparations made in the laboratory by students in pharmacy; private laboratory for instructors: a gas analysis room, entirely cut off from the system of heating and ventilating, to avoid undue fluctuations of temperature, furnished with a table specially constructed, and containing a full set of Bunsen's gasometric apparatus, an inductive coil, battery, mercury, etc.; and a store room with apparatus for all kinds of work in quantitative analysis.

The apparatus for general use includes a large platinum retort for the preparation of hydrofluoric acid; a Geissler's mercurial air pump; Hoffman's apparatus for illustrating the composition of compound gases; a Soliel-Scheibler's saccharimeter; an excellent set of areometers; a Hauy's goniometer; a camera with Ross' lenses; a Ruhmkorff's coil; galvanic batteries of Grove and Bunsen, and a potassium dichromate battery; a galvanometer; a spectroscope; microscopes; gas combustion furnaces for organic analysis, etc.

On the mansard floor ample provision has been made for the study of Photography.

COURSE IN CHEMISTRY.

Required for Degree of B. S. in School of Chemistry.

FIRST YEAR.

1. Chemistry, General and Applied; Trigonometry; Free Hand Drawing; French.
2. Chemistry and Larboratory Practice; Conic Sections; Free Hand Drawing; French.
3. Organic Chemistry and Laboratory Practice; Free Hand Drawing; Calculus; French.

SECOND YEAR.

1. Chemistry and Laboratory Practice; Physology or Botany; German.
2. Agricultural Chemistry and Laboratory Practice; Microscopy; German.
3. Agricultural Chemistry and Laboratory Practice: Vegetable Physiology; German.

THIRD YEAR.

1. Laboratory Practice; Mineralogy; German.
2. Laboratory Practice; Physics; German.
3. Laboratory Practice; Physics; German.

FOURTH YEAR.

1. Laboratory Practice; Mental Science; Physiography.
2. Laboratory Practice; Constitutional History; Logic.
3. Laboratory Practice; Political Economy; Geology.

Students who are candidates for the degree of B. S. in the School of Chemistry must perform the laboratory work as laid down in some one of the prescribed chemical courses.

SCHOOL OF NATURAL HISTORY.

The School of Natural History is especially intended to provide a general preparation for the professions and business pursuits requiring more of an acquaintance with the methods and facts of science than with those of literature. More specifically, it is designed (1.) To afford a thorough liberal education with a basis in the sciences and the modern languages; (2.) To prepare for the teaching of the natural history subjects either in the higher schools or as a professional specialty; (3.) To lay a liberal foundation in biological work and study for a course in medicine; (4.) To prepare for the pursuit of specialties in zoology, botany, general biology and geology as a scientific career.

The natural history course of four years leads to the degree of Bachelor of Science. It is distinguished by unusually full instruction in the biological subjects and in the other modern sciences, combined with a thorough course in French and German. It offers two hours a day for a year in botany, and the same each in zoology and in general or special biology; a term each of entomology, of human anatomy and physiology; of microscopy, and of mineralogy; two terms each of geology and of physics; a year of chemistry; a term each of physiography and of astronomy; a year each of free-hand drawing and of French; five terms each of German and of history; one term each of conic sections, trigonometry, political economy, mental science, and logic; and the equivalent of twenty-nine weeks' work, for one hour a day, in practical English composition and oratory.

In zoology, botany, general biology, entomology, geology, microscopy, chemistry, and mineralogy, a thorough course of laboratory work and practice by the students, done under the guidance and criticism of an instructor, is supplemented and developed by lecture and the study of text.

The biological work of the senior year is rendered so far elective in character that it may be made to lead towards the study of medicine, towards natural history teaching, or towards the pursuit of a special scientific career.

Special and elective study is permitted and provided for, but does not lead to a degree.

Graduates in literary courses who wish also the advantages of a scientific course, may pursue elective work or may usually take in two years the degree of Bachelor of Science by carrying the scientific studies of the course alone.

SPECIAL STUDIES.

Botany.—Candidates for admission are examined upon Gray's Lessons in Botany, or an equivalent, and are expected to be able to analyze readily common wild flowers. Beginning with the Fall term of the sophomore year, systematic and structural Botany is continued by recitations. illustrated lectures, and laboratory work upon fresh, dried, and alcoholic specimens. Students, throughout the course, are required to observe for themselves, and to make notes and drawings of their investigations. A series of these drawings, upon a uniform scale, together with the accompanying descriptions, is deposited in the laboratory. Each student provides himself with suitable pencils, drawing pens, and paper, needles in handles, glass sildes for mounting objects, and razor for making thin sections.

The first half of the Fall term is devoted to the study of the natural orders of flowering plants, their geographical distribution, importance. etc., together with a history of a few special plants and their products. During this time, students analyze in the Laboratory flowering plants of the more difficult orders, Compositæ, Gramineæ, etc., especially such as are best obtained in Autumn. During the last half of the term the general morphology of plants, including vegetable anatomy and histology, is studied, practical laboratory work with the microscope being the basis of the instruction. Tests are made from time to time by the use of disguised vegetable substances.

The special morphology of the great divisions of the vegetable kingdom, their chief characteristics, their classifications, and the identification of species of flowerless plants, constitute the work of the second term. Special attention is

given to injurious fungi, from specimens in the herbarium, or grown in the laboratory. Aquaria furnish numerous kinds of fresh water algæ, and the green-houses supply specimens in nearly all the groups studied.

Vegetable Physiology is studied in the third term. The instruction is given by lectures or text-book, and by experimental practice. The work includes: The food of plants and its absorption and assimilation; fluids, their kind, uses, causes of movement, transpiration, respiration, etc.; processes, peculiarities, and results of growth; relations and effects of temperature, light, gravitation, etc.; self and cross fertilization, relation of plants and insects; movements, "sleep of plants," tendrils, climbing vines, etc.; origin and development.

Throughout the course the attempt is made to introduce the students to the literatuie of the various subjects and to acquaint them with the authorities for the facts stated.

Microscopy.—Students have in this study further practice in the use of the compound microscope, the management of light for particular purposes, the testing of lenses, measurement of magnifying powers and angles of aperture, drawing and photographing objects, the preparation and mounting of material, etc. The application is mainly but not exclusively devoted to vegetable tissues and products.

The special aim is to afford the opportunity of gaining a skillful and rational use of the instrument, and an acquaintance with the best methods and processes of preparing and mounting objects. Students provide themselves with slides and covers, needles, forceps, brushes, and razors. Microscopes, section cutters, turn tables, etc., are furnished by the University.

Anatomy and Physiology.—The students admitted to this class have already passed an entrance examination in the elementary principles of anatomy and physiology ("letters comprehensive" or an equivalent). They have also had a year's training in zoology, which makes a free use of the facts of comparative anatomy possible, and aids greatly in the work of the course.

The main objects of the course are, to make the student familiar with the position, structure, and healthy action of those organs most liable to become diseased; to make plain

the part which the nervous system plays in both the healthy and morbid action of the various organs, and in the problems of nutrition and energy.

The subject is taught during the fall term of the junior year. The plan embraces lectures, recitations from the text-book, frequent, almost daily, readings from standard authors, and demonstrations from fresh dissections, alcoholic specimens, microscopical preparations, skeletons, and the manikin.

The library of the University is kept supplied with the standard works and periodicals on anatomy, histology, physiology, and kindred subjects.

Zoology.—The object of the Zoological course is primarily to give the students command of the methods of Zoological research and study, and to derive from these their distinctive discipline. The subject is taught during the whole of the Sophomore year, the course being based throughout on individual work in the Zoological laboratory, and in the field. The result thus arrived at are supplemented by lectures and demonstrations, and by the study of text. (Sedgwick's claus.)

The more important features of the work are (1) comparative dissections, descriptions, drawings, and microscopic preparations of types of the greater groups, as a basis for the study of the subkingdoms and their more important divisions; (2) lectures on the comparative physiology of selected forms with especial reference to their relations to their environment, organic and inorganic, present and past; (3) studies of the zoological classification, commonly introduced by analytical synopses, exhibiting the technical relations of groups; (4) lectures and elaborate reviews directed especially to the general system of homologies by which zoological science is organized as a coherent whole; (5) a brief course in general embryology, given with principal reference to the descent of animals and as a preparation for later work in special embryology; and (6) lectures on the history of zoological science and its final generalizations.

The *general biology* of the senior year includes comparative histology, and the embryology of the earthworm and of the chick; in plants development and reproduction in the various groups of cryptogams and phanerogams and the culture of bacteria, etc.

Geology.—During the second and third terms of the senior year two hours daily are given to the study of geology.

The plan includes lectures, and recitations from the text-book, with selected readings; much practice in the determination of rock forming minerals, rocks, fossils, and in making of sections and maps.

The first term is devoted to the study of the Earth and its rocks, as we find them, to the discovery of the forces now acting, and their effects, and to tracing through these, the conditions under which the existing rocks were deposited.

In the second term the aim is to deduce, by means of the facts already learned, the geologic history of the Earth, and the physical changes through which it has passed; to become acquainted with the succession of living forms as shown in the appearance and disappearance of their types; and to learn the location and uses of deposits of economic value.

Physography.—Under this name a term's work is provided in general natural science, making use of the sciences of the course previously taught towards a natural history of the Earth and its inhabitants and in explanation of the general phenomena of Meteorology and Climatology together with the past and present distribution of plants and animals. Anthropology is included as a part of the term's instruction.

Entomology.—The study of Entomology, pursued during a single term of the Freshman year, is necessarily made largely empirical and practical, the subject to which it is principally directed being the place of the insect world in the general system of organic life; and, incidentally to this, the relations of insects to the interests of man.

The foundation for a knowledge of structural Entomology is laid by the discussion and detailed study of a typical insect; and for that of the orders, by a generalization of the characters of selected groups of specimens representing each.

A large part of the time is devoted to the study of the characters, life histories, habits, and economic relations of one hundred species of especially important insects. Specimens of these in their different stages, together with synopses and descriptions of the families to which they belong, are furnished the students, and the essential facts not discovera-

te by direct observation, are given in lectures or acquired by study of text.

Practice in field observations is given as opportunity offers, and all are taught the ordinary methods of the collection, preparation, and care of specimens, together with the approved methods of controlling the ravages of the injurious species. A careful and complete description of some one species, illustrated by drawings of important parts, is made by each student and deposited in the library of the school.

Besides the collections, apparatus, and entomological library of the University, the students in this course have access to the collections and library of the State Entomologist, and the practical use of the many thousand duplicate insects belonging to the office. In both field and laboratory work, an extraordinary opportunity is afforded competent students of this course to observe and assist in practical entomological work and original research.

Mineralogy.—Fourteen weeks; about six weeks are occupied in lectures on crystallography; Nauman's system of symbols is used and explained. A collection of models, comprising the most important forms and combinations in the various systems of crystalization, is used for illustration and study. The remainder of the term is occupied by the descriptive determination of minerals, and the use of the blow pipe. A very complete collection of minerals, both American and foreign, has been furnished for this purpose.

APPARATUS.

In *Botany*, the school has a collection of about one thousand species of the plants indigenous to the State of Illinois, including a very nearly complete set of the grasses; a collection of Rocky Mountain and Western plants; a collection of plants from Dr. Vasey, Botanist of the Department of Agriculture, Washington, D. C.; and others obtained by exchange from various parts of the United States. A collection of fungi contains numerous species. The greenhouses and out-door plantations furnish a large amount of illustrative material for the classes. Enlarged *papier-mache* models of flowers and fruits, exhibiting structure and development, are in the cabinet.

In *Entomology* numerous species have been contributed by the State Entomologist, who is required by law to deposit

his first series of specimens in the cabinet of the University. Local collections and exchanges have increased the number to about three thousand species.

The University has about thirty compound microscopes, representing the best American and European makers.

Zoology.—The Museum is particularly fortunate in its collections in Zoology, possessing, in mounted specimens of skeletons, nearly all the ruminants of North America, and representative of all orders of mammals except Proboscidea; exhibiting fifty species by eighty mounted specimens, with numerous skeletons. In birds it represents all the families of North America, having two hundred and forty species. ·esented by over four hundred specimens. Its Articulates ·r more than three thousand specimens; its fishes, four ·ts radiates, three hundred, and its reptiles nearly .red. Sea, land, and fluviatile shells are represented .nteen hundred species. The Museum also contains , one hundred specimens, representing the osteology of .ebrates; a large collection of the nests and eggs of birds; .ollection of Indian implements; and a manikin, a dissected .ye, and a trachea, in *Papier-mache.*

Geology.—The Geological Cabinet contains Prof. Ward's celebrated college series of casts of famous fossils, including the gigantic Megatherium nearly eighteen feet in length; the Elephas Ganesa with tusks ten-and-a-half feet long; the Collossochelys Atlas,—a gigantic tortoise with a shell eight feet by six; and the Plesiosaurus Cramptoni, twenty-two and a half feet. It also contains a series of tracks in the sandstone of the Connecticut river; a large collection of carboniferous ferns from the celebrated locality at Morris, Ill.; several thousand specimens of fossils from the State Geological Survey, and from purchase in Europe; and a large number of specimens illustrating building materials, dikes, veins, metamorphism, drift bowlders, etc.; about four thousand specimens, not yet arranged, have been added during the past year.

Mineralogy.—The Cabinet of Minerals consists of a valuable and extensive collection of the leads of the State, and accompanying minerals; a collection of models, comprising the most important forms and combinations in the various systems of crystallization; and a very complete collection of minerals, both American and foreign.

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Practice in field observations is given as opportunity offers, and all are taught the ordinary methods of the collection, preparation, and care of specimens, together with the approved methods of controlling the ravages of the injurious species. A careful and complete description of some one species, illustrated by drawings of important parts, is made by each student and deposited in the library of the school.

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his first series of specimens in the cabinet of the University. Local collections and exchanges have increased the number to about three thousand species.

The University has about thirty compound microscopes, representing the best American and European makers.

Zoology.—The Museum is particularly fortunate in its collections in Zoology, possessing, in mounted specimens of skeletons, nearly all the ruminants of North America, and representative of all orders of mammals except Proboscidea; exhibiting fifty species by eighty mounted specimens, with numerous skeletons. In birds it represents all the families of North America, having two hundred and forty species, represented by over four hundred specimens. Its Articulates number more than three thousand specimens; its fishes, four hundred; its radiates, three hundred, and its reptiles nearly one hundred. Sea, land, and fluviatile shells are represented by seventeen hundred species. The Museum also contains nearly one hundred specimens, representing the osteology of vertebrates; a large collection of the nests and eggs of birds; a collection of Indian implements; and a manikin, a dissected eye, and a trachea, in *Papier-mache.*

Geology.—The Geological Cabinet contains Prof. Ward's celebrated college series of casts of famous fossils, including the gigantic Megatherium nearly eighteen feet in length; the Elephas Ganesa with tusks ten-and-a-half feet long; the Collossochelys Atlas,—a gigantic tortoise with a shell eight feet by six; and the Plesiosaurus Cramptoni, twenty-two and a half feet. It also contains a series of tracks in the sandstone of the Connecticut river; a large collection of carboniferous ferns from the celebrated locality at Morris, Ill.; several thousand specimens of fossils from the State Geological Survey, and from purchase in Europe; and a large number of specimens illustrating building materials, dikes, veins, metamorphism, drift bowlders, etc.; about four thousand specimens, not yet arranged, have been added during the past year.

Mineralogy.—The Cabinet of Minerals consists of a valuable and extensive collection of the leads of the State, and accompanying minerals; a collection of models, comprising the most important forms and combinations in the various systems of crystallization; and a very complete collection of minerals, both American and foreign.

COURSE IN SCHOOL OF NATURAL HISTORY.

Required for the Degree of B. S. in School of Natural History.

FIRST YEAR.

1. Chemistry; Free-Hand Drawing; Trigonometry; French.
2. Chemistry; Free-Hand Drawing; Conic Sections; French.
3. Chemistry or Free-Hand Drawing; Economic Entomology; French.

SECOND YEAR.

1. Zoology; Botany; German.
2. Zoology; Botany; German.
3. Zoology; Vegetable Physiology; German.

THIRD YEAR.

1. Anatomy and Physiology; Mineralogy; German; Ancient History (optional, extra).
2. Geology; Physics; German; Mediæval History (optional, extra).
3. Geology; Physics; Modern History.

FOURTH YEAR.

1. Physiography or Biology; History of Civilization; Mental Science.
2. Microscopy or Biology; Constitutional History; Logic.
3. Biology; Astronomy; Political Economy.

In this course three terms of University Latin will be accepted in lieu of three terms of French; and five terms of such Latin for five terms of German.

College of Literature and Science.

SCHOOLS.

ENGLISH AND MODERN LANGUAGES.

ANCIENT LANGUAGES.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, Ph. D., LL. D., REGENT.
EDWARD SNYDER, M. A., *Dean;* Modern Languages.
THOMAS J. BURRILL, M. A., Ph. D., Botany.
SAMUEL W. SHATTUCK, M. A., C. E., Mathematics.
JOSEPH C. PICKARD, M. A., English Language and Literature.
JAMES D. CRAWFORD, History and Ancient Languages.
PETER ROOS, Industrial Art.
WILLIAM McMURTRIE, E. M., Ph. D., Chemistry.
STEPHEN A. FORBES, Ph. D., Entomology and Zoology.
JAMES H. BROWNLEE, M. A., Rhetoric and Oratory.
CHARLES W. ROLFE, M. S., Geology.
HERBERT H. SARGENT, Lt. U. S. A., Military Science.
NATHANIEL BUTLER, Jr., M. A., Ancient Languages.
CHARLES E. EGGERT, Ph. B., Modern Languages.

ADMISSION.

Candidates for the School of English and Modern Languages will be examined in Algebra, Geometry, Natural Philosophy, Physiology, and Botany, and the Latin mentioned below, but not the Greek. Notice is given that, beginning with the Fall term of 1887, students desiring to enter the College of Literature and Science must pass the

examinations in preparatory Latin before they can be matriculated.

Candidates for the School of Ancient Languages will be examined in Greek, but not in the elements of Botany, Physiology, or Natural Philosophy. The examinations in Latin and Greek will be as follows:

LATIN.

Latin Grammar, including Prosody (Harkness', or Allen and Greenough's); Latin prose composition (forty-four exercises, to the passive voice, in Arnold's Latin Prose Composition, or parts one and two, to page 196, of Harkness' Introduction to Elementary Latin Prose Composition, or an equivalent in Allen and Greenough's Latin Composition); four books of Cæsar's Commentaries, six orations of Cicero, and six books of the Æneid. *Real equivalents* for any of the above mentioned works will be accepted.

GREEK.

Greek Grammar (Goodwin's or Hadley's) Greek Prose Composition (Jones' Exercises in Greek Prose Composition or an equivalent in Arnold's), and four books of Xenophon's Anabasis. Writing Greek with the accents will be required. *The Greek Etymology must be thoroughly learned.*

The so-called Continental sounds of the vowels and diphthongs, and pronounciation according to the accent, are recommended.

OBJECT OF THE SCHOOLS.

The object of the Schools in this College is to furnish a sound and liberal education to fit students for the general duties of life, and especially to prepare them for those business pursuits which require a large measure of literary and scientific knowledge and training. They meet the wants of those who wish to prepare themselves for the labors of the press as editors and publishers, for teachers in the higher institutions or for the transaction of public business.

Students in the Agricultural and other Technical Schools, desiring to educate themselves as teachers, and professors, in

their special departments, require a knowledge of the ancient, as well as of modern languages, to give them a full command of all the instruments and facilities required for the highest proficiency in their studies and proposed work. The University seeks through the Schools to provide for this important part of its mission—the furnishing of teachers to industrial schools of the country, and investigators and writers for the arts.

INSTRUCTION.

The plan of instruction embraces, besides the ordinary text-book study, lectures and practical exercises in all the departments, including original researches, essays, criticism, and other work intended to illustrate the studies persued, and to exercise the student's own powers.

A prominent aim will be to teach the right use of books, and thus prepare the students for self-directed investigation and study, which will extend beyond the curriculum of his school and the period of his graduation. With this view, constant use of the already ample and continually enlarging stores of the Library will be required and encouraged. As a further aid in this direction. members of the advanced classes are usually selected to act as assistant librarians. In this service they are able to obtain much valuable knowledge of various departments of literature and science, of prominent authors, and the extent and scope of their writings. Of special value as an incentive to, and the means of practice in English Composition should be mentioned THE ILLINI, a semi-monthly paper edited and published by the students of the several colleges, each of which is appropriately represented in its columns. A printing office has been provided in the mechanical building, and a press with a requisite supply of type.

The *Library* is well supplied with works illustrating the several periods of English, American, French, and German Literature, as also those of Ancient Literature. It contains at present over sixteen thousand well selected volumes, and is constantly growing by purchase at home and abroad. Valuable American and Foreign periodicals are received regularly in the Reading Room. (See list on page 27 and 28.)

SUBJECTS COMMON TO THE SCHOOLS OF THIS COLLEGE.

MATHEMATICS.

First Term.—Trigonometry, plane and spherical; fundamental relations between the trigonometrical functions of an angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications.

Second Term.—Conic Sections, geometrical method. Definitions and general properties of the ellipse, hyperbola, and parabola; curvature of the conic sections. Analytical Geometry, elements of. Properties and relations of the point and right line in a plane; of the conic sections.

Third Term.—Differential Calculus; the differentiation of functions of a single variable; development of functions. Infinitesimals; order of an infinitesmal; the substitution of one infinitesimal for another; the limit of the ratio of two infinitesimals, the limit of the sum of infinitesimals. Integral Calculus; Formulus for direct integration and by substitution; integration by parts; simplification by transformation; area of a segment of a circle, of an ellipse, of an hyperbola; length of an arc of a circle, of a parabola, etc.

Text Books.—Coffin's Conic Sections and Analytical Geometry. Byerly's Calculus.

PHYSICS AND ASTRONOMY.

For these subjects, see College of Engineering.

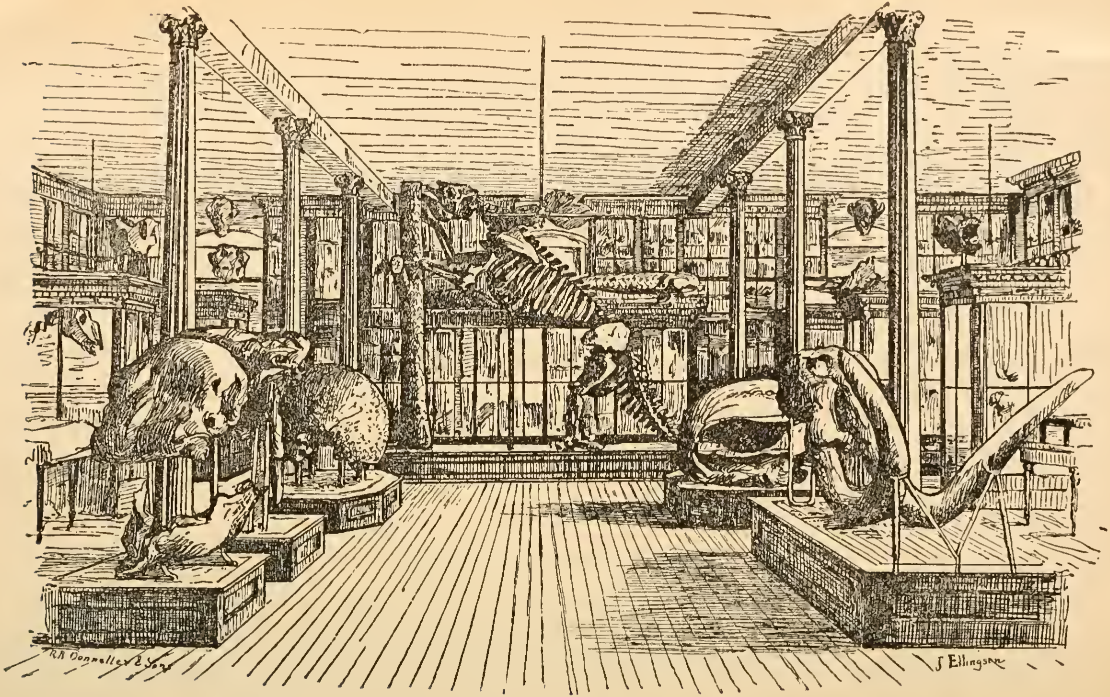
NATURAL SCIENCE.

See College of Natural Science.

HISTORY AND SOCIAL SCIENCE.

The historical studies are designed to afford a general view of the history, social organization, and progress of the race. They embrace also the history of the arts and sciences, and of civilization, the principles of civil polity and law, the philosophy of history, and the principles of political economy and constitutional law.

The course occupies six terms in the Junior and Senior years of the University Course.



MUSEUM.

JUNIOR YEAR.

Ancient History of Greece and Rome, with notices of other nations; Ancient Geography; Mediæval History; Modern History; European Geography.

SENIOR YEAR.

Constitutional History of England and the United States; History of Civilization; Analysis of Historical Forces and Phenomena, Notices of the Arts and of the Inductive Science; Political Economy.

PHILOSOPHY AND LOGIC.

The studies of this department require much maturity of powers and are therefore confined to the Senior year of the University Course.

Mental Philosophy. Analysis and classification of mental phenomena; theories of perception, consciousness, imagination, memory, judgment, reason. Mental physiology, or connection of body and mind, healthful condition of thought, growth and decay of mental and moral powers. Philosophy of education, theory of conscience; nature of moral obligation; moral feeling. The Right. The Good. Practical ethics; duties. Formation of character. Ancient schools of philosophy; modern schools of philosophy. Influence of philosophy on the progress of civilization, and on modern sciences and arts.

Principles of Logic; conditions of valid thinking; forms of arguments, fallacies and tneir classification. Inductive and scientific reasoning; principles and methods of investigation. Practical applications of logic in the construction of arguments, in the detection and answer of fallacies, and the formation of the habits of thinking and common judgment of life.

SCHOOL OF ENGLISH AND MODERN LANGUAGES.

ENGLISH LANGUAGES AND LITERATURE.

Studies of the School.—In the arrangement of the studies the endeavor is to present a thorough and extended drill in grammatical and philological study, and in the authors and history of the English language, affording a training equivalent to the ordinary studies of the classical languages. This drill extends through three years of the course, but may be shortened according to the ability and preparation of the student.

The first two terms of the first year are given to a general survey of the whole field of British and American literature from the middle of the sixteenth century to the present time. All the representative writers come into notice, and representative specimens from the writings of each are carefully read in class. Moreover, each student is required each term to read an entire work of some classic author, making choice from a prescribed list. Frequent exercises in writing abstracts, or original compositions on themes assigned, are also required. The study of Rhetoric occupies the first term.

During the second year four or five of the great masters are studied, their work analyzed, and the shaping forces of their times, with their influences upon succeeding times, are investigated. Lectures are given from time to time on poetry, epic, lyric, dramatic, etc. Writing and reading required as in first year.

In the Senior year attention is given to Old English; to the Anglo-Saxon, for which the way has been prepared by the study of both English and German, and to Philology. Essays, forensics, and orations are required.

French and German.—The modern languages taught in this School are confined to one year of French and two years of German. Abundant practical exercises are given both in composition and translation, and the diligent student gains the power to read with ease scientific and other works in these languages, and may, with a little practice write and speak them with correctness. Constant attention is also given to the etymologies common to these languages and the English, and thereby a large advantage in linguistic culture is gained by the student. "He who knows no foreign tongue," said Goethe, "knows nothing of his own."

In the first year the student passes over a complete grammar and reader, acquiring a knowledge of the technicalities of the idiom, with a sufficient vocabulary for the use of books of reference within the course. The second year is devoted to a critical study of the languages and philological analysis, and to a course of select reading, composition, and conversation.

COURSE IN SCHOOL OF ENGLISH AND MODERN LANGUAGES.

Required for Degree of B. L.

FIRST YEAR.

1. Rhetoric or Cicero de Amicitia; French; Trigonometry.
2. American Authors or Livy; French; Conic Sections.
3. British Authors; French; Calculus, or Free Hand Drawing; Horace (optional, extra).

SECOND YEAR.

1. English Classics; German; Physiology or Botany.
2. English Classics; German; Zoology or Botany.
3. English Classics; German; Astronomy.

THIRD YEAR.

1. German; Chemistry; Ancient History.
2. German; Physics; Mediæval History.
3. German; Physics or Chemistry; Modern History.

FOURTH YEAR.

1. Anglo-Saxon; Mental Science; History of Civilization.
2. Early English; Logic; Constitutional History.
3. Philology; Political Economy; Geology.

SCHOOL OF ANCIENT LANGUAGES AND LITERATURE.

In the School of Ancient Languages and Literature, the methods of instruction, without swerving from their proper aim, to impart a sufficiently full and critical knowledge of the Latin and Greek languages and writings, will make the study of these tongues subservant, in a more than usual degree, to a critical and correct use of the English. With this view, written translation, carefully prepared, with due attention to differences, equivalences, and substitutions of idioms, and the comparison and discrimination of synonyms, will form part of the entire course.

The study of Latin and Greek Composition will constitute a weekly exercise through the first year, and will be continued, to some extent, through the course. Essays, historical and critical, will be required from time to time, in connection with the works read, and a free use of the library is urged. It is intended that each student who contemplates the course in Ancient Languages shall have a clear knowledge of the history of Greek and Latin Literature, and of the principal authors

in both languages. As an aid to the appreciation of the literature of the two peoples, Greek and Roman history will form an important part of the course, and will be taken up in the beginning, illustrating the works read. In the first term of the third year Ancient History is taken up as a separate study, and especial attention is then given to the history of Greece and Rome, and the nations with whom they came in contact. Classes will be formed for the students who wish to carry their classical study further than the prescribed course, and every assistance will be given them.

COURSE IN SCHOOL OF ANCIENT LANGUAGES.

Required for Degree of B. A.

FIRST YEAR.

1. Cicero de Amicitia and prose composition; Iliad and prose composition; Trigonometry.
2. Livy and prose composition; Odyssey and prose composition; Conic Sections.
3. Odes of Horace and prose composition; Memorabilia and prose composition; Calculus.

SECOND YEAR.

1. Satires of Horace; Thucydides or German; Physiology.
2. Terrence; Sophocles or German; Zoology.
3. Tactitus; Demosthenes or German; Astronomy.

THIRD YEAR.

1. Juvenal or French; Chemistry; Ancient History.
2. Quintilian or French; Physics; Mediæval History.
3. De Officiis or French; Physics; Modern History.

FOURTH YEAR.

1. Mental Science; History of Civilization; Physiography.
2. Logic; Constitutional History; Early English.
3. Political Economy; Philology; Geology.

DEPARTMENT OF RHETORIC AND ORATORY.

Particular attention is given to training in writing and speaking, and in the exercises of this department all students are required to participate. Such a course of instruction in Composition and Oratory is provided as makes it probable that all who complete it faithfully will be able to express their thoughts, both with voice and pen, in a clear, intelligent manner, and without affectation or embarrassment.

With the exception of the last term of the Freshman year, which is devoted to the text book of Rhetoric, the required theme-writing, extends over the first two years of the course, the remaining two being given to the art of oratory, including the principles of oral expression.

The number of themes from Freshmen is eight, and from Sophomores twelve, and each paper after correction is returned to the student to be carefully re-written. For composition the classes are divided into sections of about twenty, which meet weekly. At these meetings, questions of students are answered, the faults and merits of the essays of the preceding week are pointed out, and subjects assigned for the next week. Two lectures each term are given by the professor to the whole class, on the kind of writing involved in the next five weeks, as narration, description, argument, etc.

In oratory, the classes are also divided into sections. A critical analysis is made of some of the master-pieces of the great orators of England and America. The life and character of the orator, the circumstances that called forth the oration, his object in pronouncing it, are considered, and a study is made of his diction, sentences, paragraphs, figures of speech, etc. In addition, selections from the oration are assigned to the members of the class, which, after being well committed to memory, are carefully prepared, under the supervision of the instructor, for delivery in the presence of the whole class.

Additional Schools.

NOT INCLUDED IN THE FOUR COLLEGES.

SCHOOL OF MILITARY SCIENCE.

PROFESSOR HERBERT H. SARGENT,
2ND LIEUT. 2ND CAVALRY, U. S. A.

By the law of Congress, and of the State, the University is required to teach Military Tactics to its students. All able-bodied male students of the Preparatory year and of College classes of the first, second, and third years are enrolled in the companies of the University battalion, and receive instruction in the following military exercises:

School of the Soldier; Manual of Arms.
School of the Company; Movements by Platoons, Firing, etc.
School of the Battalion; Ployment and Deployment of Close Columns.
Battalion and Company Skirmish Drill; Bugle Calls.
Bayonet Fencing; Target Practice.
Guard and Picket Duties of Sentinels.

CLASS IN MILITARY SCIENCE.

Classes are taught in military science and tactics, as far as is requisite for officers of the line. From these classes are selected the officers of the several companies, for which they act as instructors. The military instruction is under the charge of Lieut. Herbert H. Sargent, a graduate of the U. S. Military Academy, and an officer of the regular army of the United States. A full supply of arms and ammunition is furnished by the War Department, including 300 cadet rifles and accoutrements, two pieces of field artillery, 1,000 ball cartridges and 1,000 blank cartridges annually for target practice, with 100 cartridges and 300 friction primers for artillery.

No student is eligible to the military class till he has reached the third term of the Freshman year, nor unless he is in good standing in all his studies. The course of instruction is confined strictly to two years. No student will be permitted to retain a command who does not maintain a good standing in conduct and scholarship.

The instruction and class exercises occupy about three hours each week, arranged as far as possible so as not to interfere with any other course of study. Students must be careful, however, to ascertain, before entering the military class, that the proper studies and exercises of their chosen courses will not be interfered with.

Commission.—The Governor of the State is accustomed to commission as captains, by brevet, in the State militia, such graduates of the University as have completed the studies of the military classes and have obtained the requisite experience in command in the University battalion. In order to obtain the commission the student must be approved by the Faculty and pass satisfactorily an examination in military science and tactics before a committee appointed by the Faculty of the University. It is expected that in order to get the required experience in command, the members of the military class of the third or Junior year will serve as commissioned officers of the several companies of the battalion.

University Uniforms.—Under the authority of the acts of incorporation, the Trustees have prescribed that all male students, after the first term of their attendance, shall wear the University uniform. The University cap is to be worn from the first. The uniform consists of a suit and cap of cadet gray cloth. Students can procure them ready made on their arrival here. The University cap is ornamented in front with the initials U. of I., surrounded by a wreath. Students will always wear their uniforms on parade, but in their rooms and at recitation may wear other clothing.

The University Library contains many books on Military Science, Military History, and Engineering.

Gymnasium.—The Drill Hall is furnished with a full set of gymnastic apparatus, and classes in gymnastic exercises are organized in the fall and winter terms, under careful leaders. Fee, 50 cents.

The University Cornet Band is composed of students who, while members of the band, are excused from drill. Instruments and music are furnished by the University, and the band plays at drill, and other college exercises.

COURSE IN SCHOOL OF MILITARY SCIENCE.

FIRST YEAR.

1. School of the Soldier and Company; Bayonet Fencing.

SECOND YEAR.

1. School of Battalion; Skirmish Drill.
2. Ceremonies and Reviews; Military Signaling; Sword Fencing.
3. Guard, Outpost, and Picket Duty; Military Signaling; Sword Fencing.

THIRD YEAR.

1. Military Administration; Reports and Returns; Theory of Fire-Arms; Target Practice; Artillery Drill.
2. Organization of Armies; Art of War; Field Fortifications; Artillery Drill.

SCHOOL OF ART AND DESIGN.

PROFESSOR PETER ROOS.

This School is to subserve a two-fold purpose: 1. It affords to the students of the several colleges the opportunity to acquire such a knowledge of free-hand drawing as their chosen courses may require. 2. It offers to such as have a talent or taste for art the best facilities for pursuing studies in industrial designing or other branches of fine art. Schools of design, in Europe and in this country, have been found important aids to the higher manufactures, adding to the beauty of fabrics, and to the skill and taste of workmen.

The increased interest in the decorative arts, and in the manufactures which they require, has added new importance to the study of drawing and designing. It is the purpose to keep this school of design abreast with the best movements in this direction.

COURSE IN INSTRUCTION.

FIRST YEAR.

1. Form Analysis and Construction; Elementary Perspective; Combination Drawing.
2. Shading from Objects; Science of Perspective; Clay Modeling.
3. Drawing from Casts; Tinted Designs; Modeling of Ornaments.

SECOND YEAR.

1. Historic Styles of Ornament; Science of Color; Mould-making and Casting in Plaster.
2. Monochrome Painting; Designs from Plants; Modeling from Shaded Examples.
3. Constructive Designs; Water Color Drawing; Modeling from Nature.

Students having passed the above course may enter either of the following courses:

COURSE IN DESIGNING.

THIRD YEAR.

1. Decoration in Historic Styles; Drawing of Common Objects; Modeling.
2. Designs for Specified Material; Study of Drapery; Art Anatomy.
3. Designs for Furniture; Water Color Drawing; Art Anatomy.

FOURTH YEAR.

1. Tempera Painting; Designs for Monuments; Modeling.
2. Drawing from Life; Designs for Memorial Windows; Modeling.
3. Ecclesiastic Decoration; Emblems and Still Life in Tempera Color; Modeling or Oil Painting.

COURSE IN PAINTING.

THIRD YEAR.

1. Drawing from Statuary; Water Color Painting; Art Anatomy.
2. Imitation of Various Stuffs and Materials; Drawing from Life.
3. Painting from Groups; Sketching from Nature; Art Anatomy.

FOURTH YEAR.

1. Drawing from Life; Composition; Painting of Still Life.
2. Painting from Life; Pictures from Description.
3. Painting from Nature; Illustration of Prescribed Subjects.

As a preparation for entering the course in Art and Design, the study of Plane Geometry and Projection Drawing is recommended.

Topics for reading upon art subjects are given weekly.

Detailed Studies and Sketches such as are necessary to the successful rendering of things, will be required outside of the regular exercises.

For admission to advanced classes the student must show proficiency in preliminary work.

The authorities of the University have provided that persons not connected with the Institution may join the drawing and painting classes on very moderate terms.

MUSIC.

Music constitutes no part of any University course of studies, and is therefore not provided by the Trustees. But as many students, especially young ladies, desire instruction in music, competent teachers are selected by the Trustees, and rooms are set apart for instruction.

COURSE OF INSTRUCTION.

Plaidy's Technical Studies. Kohler. Op. 151. Short course. Op. 207. No. I. Krug. Bertini. Op. 29. Czerney. Op. 299. Clementi. Op. 36, 37, 38. Heller. Op. 47, 49, 46. W. S. B. Matthews Phrasing Studies: Cramer. books 1. 2. 3. 4. Gradus ad Parnassum. Clementi. Chopin. Op. 10. With works and pieces from the old masters.

TUITION.

Instruction. term of ten weeks—2 lessons a week....	$10.00
For term of ten weeks. one lesson a week...........	6.00
Practice on piano. one hour daily. per term..........	2.00

MISS C. MAUD KIMBALL.

Teacher of Vocal Music and Voice Culture. follows the Italian method. giving individual instruction.

TERMS.

Ten weeks—two lessons a week.....................	$12.00
Ten weeks—one lesson a week......................	7.00

No deductions on account of absence in either course. except in case of protracted illness.

Special students in music will also be charged the regular term fee charged other students of the University.

PREPARATORY CLASSES.

To meet an urgent demand, the Trustees have provided for teaching the preparatory studies lying between the work of the common school and that of the University.

Candidates for these classes should not be less than fifteen years old. They must pass satisfactory examinations in Arithmetic. Geography. English Grammar. and History of the United States. The examination in these branches should be equal to that usually required for a second grade certificate for teachers. This examination may be made by county superintendents.

PREPARATORY STUDIES.

The studies taught in the preliminary year are as follows:

FOR COLLEGES OF AGRICULTURE, ENGINEERING, AND NATURAL SCIENCE.

First Term.—Algebra.—(Wells'.) Fundamental rules: factoring; common divisors and multiples; powers and roots; calculus of radicals; simple equations; proportion and progression. *Physiology.*—Cutler's,) *Natural Philosophy.* (Norton's.)

Second Term.—Algebra.—Quadratic equations, etc. *Geometry.*—(Chauvenet's.) Plane Geometry, lines, circumferences, angles, polygons, as far as equality. *English.*—Elements of composition. (Kellogg's.) Orthoepy and word analysis. (Introduction to Webster's Academic Dictionary.)

Third Term.—Geometry completed, including solid Geometry and the sphere. *English*, as in the second term, with addition of Goldsmith's Traveler and Deserted Village, read for analysis. *Botany*—Gray's Manual and Lessons.

Reasonable equivalents for the work in any of the text books named will be accepted.

FOR COLLEGE OF LITERATURE AND SCIENCE.

First Term.—Algebra, as above. *Latin.*—Cicero's Orations. *Greek.*—Grammar and Reader.

Second Term.—Algebra and Geometry, as above given. *Latin.*—Virgil. *Greek.*—Xenophon's Anabasis.

Third Term.—Geometry completed. *Latin.*—Virgil's Æneid. *Greek.*—The Anabasis.

N. B.—Greek is required for only the School of Ancient Languages. The school of English and Modern Languages requires Physiology, Natural Philosophy, and Botany, instead of Greek.

Students in the preparatory studies are not matriculated as members of the University. They pay no entrance fee, but are charged a tuition fee of five dollars a term, and the incidental fee of seven and a half dollars a term. They have all the privileges of the library, and of the public lectures, and are required to drill.

N. B.—No student is matriculated as a college student until all preparatory studies are completed.

ACCREDITED HIGH SCHOOLS.

The Faculty, after personal examination, appoints accredited High Schools, whose graduates may be admitted to the University without further examination within one year after date of their graduation. These must be schools of first rate character, whose courses of instruction include all the studies required for admission to some one of the colleges of the University. On application, a member of the Faculty is sent to examine the school making application, as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. If the report is favorable, the name of the school is entered in the published list of High Schools, accredited by the University. The graduates of these schools are admitted to any of the colleges for which their studies may have prepared them. The appointment continues as long as the work of the school is found satisfactory. Annual reports are asked from these schools.

ACCREDITED HIGH SCHOOLS.

Princeton High School	Henry C Forbes,	Principal.
Lake View High School	A. F. Nightingale,	"
Champaign, West High School	M. Moore,	"
Decatur High School	John W. Gibson,	"
Urbana High School	J. W. Hays,	"
Oak Park High School	B. L. Dodge,	"
Chicago S. Division High School	Jeremiah Slocum,	"
Chicago N. Division High School	O. S. Westcott,	"
Chicago W. Division High School	Geo. P. Welles,	"
Hyde Park High School	Wm. H. Ray,	"
Marengo High School	Frank W. Burt,	"
Kankakee High School	F. M. Tracy,	"
Springfield High School	J H. Collins,	"
Monticello High School	F. V. Dilatush,	"
Warren High School	W. H. Goodall,	"
Peru High School	R. L. Barton,	"
Peoria High School	Geo. E. Knepper,	"
Galena High School	O. P. Bostwick,	"
Sycamore High School	A. J. Blanchard,	"
Rochelle High School	A. V. Greenman,	"
Rossville High School	S. B. Messer,	"
Bement High School	C. W. Groves,	"
Oakland High School	Moses Andrews,	"
Jacksonville High School	Miss Lyde Kent,	Superintendent.
Danville High School	E. C. Williams	Principal.

Charleston High School	E. J. Hoenshel,	Principal.
Tuscola High High School	W. B. Owen,	"
Streator High School	R. Williams,	"
Ottawa High School	C. W. Tufts,	"
Bloomington High School	J. W. Heninger,	"
Aurora E. Side High School	I. N. Prentiss,	"
Paris High School	A. Harvey,	"
Washington High School	J. L. Hartwell,	"
Robinson High School	L. S. Kilborn,	"
Cairo High School	T. C. Clendenin,	"
Blackstone High School, Mendota	William Jenkins,	"

SOCIETIES.

The Literary Societies have from the opening of the University enjoyed its fostering care.

The ADELPHIC and PHILOMATHEAN societies for men and the ALETHENAI for women, occupy spacious halls which the members have furnished and decorated with taste and elegance. Meetings are held on Friday evenings throughout term time, are well attended, and are maintained with unflagging interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

The YOUNG MEN'S and YOUNG WOMEN'S CHRISTIAN ASSOCIATIONS are active and useful.

Special organizations unite the students of NATURAL HISTORY, of CIVIL ENGINEERING, of MECHANCAL ENGINEERING, and ARCHITECTURE.

FRATERNITIES.

After careful and thorough investigation, the Trustees and Faculty have agreed that the original policy of the University towards these organizations should be maintained, and that the regulations which forbid the introduction here of the College Fraternities, sometimes called the Greek-letter Societies, should remain in force. All the useful purposes which such societies subserve are secured from the existing literary societies.

EXAMINATIONS.

Written examinations are held at the close of each term or oftener, and whenever any study has been finally completed. Any student failing to answer correctly 75 per cent. of the questions proposed, loses all credit for that study, and is precluded from proceeding with any other studies without special permission.

A record is kept of each student's term work and standing, and from this his final certificate of graduation is made up.

A statement of the scholarship and conduct of each student will be sent to his parent or guardian as soon as may be after the end of each term.

DEGREES AND CERTIFICATES.

The law provides that, "on recommendation of the Faculty, the Trustees may authorize the Regent, as president of the University, to issue diplomas to such persons as shall have completed satisfactorily the required studies, and sustained the examination therein, conferring such Literary and Scientific Degrees as are usually conferred by Universities for similar or equivalent courses of studies, or such as the Trustees may deem appropriate." Approved May 11, 1877.

In accordance with the law, the following system of Degrees has been adopted for the University:

1. All studies will remain, as heretofore, free. Each student may choose and pursue such studies as he may desire, subject only to such condition as to preparation, times of study, and number of studies, as may be necessary to secure efficiency in classes and economy in teaching.

2. But students who wish to be candidates for any degree must complete fully the course of studies prescribed for such degree, and must present an accepted thesis.

3. Students not candidates for any degree will be enrolled as special students, and will receive at the close of their attendance, if not less than a year, the certificates provided by law, with statements of work done and credits attained.

4. It is designed that the requirements for all the Bachelor's Degrees shall be, as nearly as possible, equal in amount and value.

5. The Degree of Bachelor of Science, B. S., will be given to those who complete either of the courses of studies in the College of Engineering, Agriculture, or Natural Science. The name of the School will be inserted after the degree.

6. The Degree of Bachelor of Letters, B. L., will be given to those who complete the course of the School of English and Modern Languages.

7. The Degree of Bachelor of Arts, B. A., will be given to those who complete the course in the School of Ancient Languages.

8. The Master's Degrees, M. S., M. L., and M. A., and the equivalent degrees of C. E., M. E., etc., will be given only to those who have pursued a year of prescribed post-graduate studies, and passed examinations thereon, or after a term of three years' successful practice. In either case an accepted thesis will be required.

BOARD.

There are many boarding-houses in Urbana and Champaign within reasonable distance of the University, where students can obtain either table board, or board and rooms, with the advantages of the family circle. Boarding clubs are also formed by the students, by which the cost of meals may be reduced to $2 per week. Some students prepare their own meals, and thus reduce expenses still further.

For estimates of annual expenses, see page 97.

The Young Men's Christian Association of the University will aid new students in procuring rooms and boarding places.

LABOR.

Labor is furnished as far as possible to all who desire. It is classified into educational and remunerative labor.

Educational labor is designed as practical instruction, and constitutes a part of the course in several schools. Students are credited with their proficiency in it as in other studies. Nothing is paid for it.

Remunerative labor is prosecuted for its products, and students are paid what their work is worth. The maximum rate paid for farm, garden, and shop labor, is *ten cents*, and for that about the buldings and ornamental grounds, *eight cents per hour*. Students of sufficient experience may be allowed to work by the piece or job, and thus by diligence or skill secure more pay.

Some students who have the requisite *skill, industry, and economy,* pay their entire expenses by their labor; but, in general, young men cannot count upon doing this at first, without a capital to begin with, either of skill or of money, to serve them till a degree of skill is required. As the

number of students increases, it is found more and more difficult to furnish the labor needed, and students cannot count so certainly upon finding employment.

GENERAL DIRECTIONS TO STUDENTS.

Young men or women desiring a liberal education, and living at a distance from a College or University, are often puzzled to understand precisely what they will be required to know and do in order to gain admission. To such, these words are addressed:

1. Notice that a College or a University (which is properly a collection of Colleges) is designed for the higher education only, and not for the study of common branches. None of the common branches, such as Arithmetic, Geography, English Grammar, Reading, and Spelling, are taught in this University. These must all be finished before you come.

2. In order to pursue profitably the true College studies, and to keep pace with the classes, you must be ready to pass a strict examination in the common branches just mentioned, and in certain other preparatory studies, differing with the different Colleges of the University. (See pages 31 and 32.)

3. If well prepared only in the common branches above named, you may be admitted, not to the College, but to the Preparatory Classes, in which you will study the other preparatory studies required for admission to College (See pp. 90–91.) All preparatory studies must be completed before you can be admitted, as a matriculated student, to any College class.

4. All College studies are arranged in regular courses, in which each term's work is designed to prepare for the next. You should enter at the beginning of the College year, in September. If unable to enter at that time, you may enter at any later time by making up the studies already passed over by the class.

5. Enter College with the purpose of going through, and make your course *regular as far as you go.* If obliged to leave before you have finished the course, you will have done the best thing for yourself in the meantime; while if you remain, the regular course is in nine cases out of ten the most useful and effective.

Students desiring only a winter's schooling should go to some high school.

EXPENSES.

THE TUITION IS FREE in all the University Classes.

THE MATRICULATION FEE entitles the student to membership in the University until he completes his studies,and must be paid before he enters. Amount $10.00

THE TERM FEE for Incidental Expenses is for each student.................................. 7.50

Each student working in Laboratories, or in the Draughting and Engineering Classes, is required to make a deposit varying from 50 cents to $12, to pay for chemicals and apparatus used, and for any breakages or damages.

ALL BILLS due the University *must be paid before the student can enter* Classes.

The following are estimated maximum and minimum annual expenses, exclusive of books and clothing, of a residence of thirty-six weeks at the University:

	MIN.	MAX.
Term Fees and Room Rent for each student	$ 28.50	$ 34.50
Table Board in Boarding Houses and Clubs	72.00	144.00
Fuel and Light	10.00	15.00
Washing at 75 cents per dozen	13.50	27.00
Total amount	$124.00	$220.50
Board and Room in Private Houses, per week	4.00	6.00

FEES IN THE PRELIMINARY YEAR, OR IN THE BUILDERS' OR FARMERS' SHORT COURSES.

Tuition per Term	$ 5.00
Incidental Fee, per Term	7.50

SPECIAL FEES.

For Instrumental Music, for 20 Lessons	$10.00
For Painting or Drawing, to special Students	10.00
Matriculation Fee	10.00
Graduation Fee	5.00

CAUTION TO PARENTS—STUDENTS' FUNDS.

The Business Agent will receive on deposit any funds parents may intrust to him to meet the expenses of their sons. *No greater error can be committed than to send boys from home with large amounts of spending money,* without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money. Students have little real need for money, beyond that required for fees, board bills, and books. The attention of parents and guardians is earnestly requested to this matter, and especially in the case of those students who are under twenty years of age.

CALENDAR FOR 1887-8.

Examination for Admission	Monday,	September 12
First or Fall Term begins	Wednesday,	September 14
First Term ends	Wednesday,	December 21

WINTER VACATION.

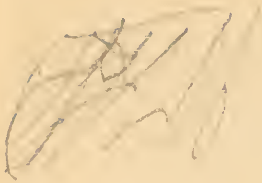
FOR 1888.

Examination for Admission to Advanced Classes,	Tuesday,	January 3
Opening of the Second or Winter Term	Wednesday,	January 4
Second Term ends	Wednesday,	March 21
Third or Spring Term begins	Thursday,	March 22
Baccalaureate Address in University Chapel	Sunday,	June 3
Class Day	Monday,	June 4
Alumni Day	Tuesday,	June 5
Commencement	Wednesday,	June 6

SUMMER VACATION.

Examinations for Admission	Monday,	September 10
First or Fall Term begins	Wednesday,	September 12

1887–88



FACULTY.

SELIM H. PEABODY, Ph. D., LL. D.
Regent.

THOMAS J. BURRILL, M. A., Ph. D.
Professor of Botany and Horticulture, and Vice President.

SAMUEL W. SHATTUCK, M. A., C. E.,
Professor of Mathematics.

EDWARD SNYDER, M. A.,
Professor of Modern Languages.

JOSEPH C. PICKARD, M. A.,
Professor of English Language and Literature.

N. CLIFFORD RICKER, M. Arch.,
Professor of Architecture.

JAMES D. CRAWFORD, M. A.,
Professor of History and Ancient Languages, and Secretary.

GEORGE E. MORROW, M. A.,
Professor of Agriculture.

PETER ROOS,
Professor of Industrial Art and Designing.

IRA O. BAKER, C. E.,
Professor of Civil Engineering.

WILLIAM McMURTRIE, E. M., Ph. D.,
Professor of Chemistry and Mineralogy.

STEPHEN A. FORBES, Ph. D.,
Professor of Entomology and Zoölogy.

THEODORE B. COMSTOCK, Sc. D.,
Professor of Mining Engineering.

JAMES H. BROWNLEE, M. A.,
Professor of Rhetoric and Oratory.

CHARLES W. ROLFE, M. S.,
Professor of Geology.

DONALD McINTOSH, D. V. S.,
Professor of Veterinary Science.

REV. NATHANIEL BUTLER, Jr., M. A.,
Professor of Latin.

ARTHUR T. WOODS,
Professor of Mechanical Engineering.

CURTIS B. HOPPIN,
First Lieut. 2nd Cavalry, U. S. A.,
Professor of Military Science and Tactics.

ARTHUR N. TALBOT, C. E.,
Assistant Professor of Engineering and Mathematics.

WILLIAM H. GARMAN,
Assistant Professor of Zoölogy.

EDWIN A. KIMBALL,
Instructor of Iron-work, and Foreman.

GEORGE W. PARKER,
Instructor in Wood-work, and Foreman.

CHARLES E. EGGERT, Ph. B.,
Instructor in Modern Languages.

EMANUEL R. BOYER,
Instructor in Mathematics.

ANNA E. MALONEY,
Teacher of Vocal and Instrumental Music.

ARTHUR W. PALMER, Sc. D.,
First Assistant in Chemical Laboratory.

BEDROS TATARIAN, B. S.,
Second Assistant in Chemical Laboratory.

THOMAS F. HUNT, B. S.,
Assistant in Agriculture.

A. B. BAKER,
Janitor.

State Laboratory of Natural History.

STEPHEN A. FORBES, Ph. D.,
Director and State Entomologist.

THOMAS J. BURRILL, Ph. D.,
Botanist.

WILLIAM H. GARMAN,
First Assistant.

CLARENCE M. WEED, M. S.
Entomological Assistant.

CHARLES A. HART,
Assistant.

MARY J. SNYDER,
Stenographer.

MERTON B. WAITE, B.S.
Botanical Assistant.

AGRICULTURAL EXPERIMENT STATION.

BOARD OF DIRECTION.

SELIM H. PEABODY, Ph. D.,
President.

E. E. CHESTER, CHAMPAIGN COUNTY,
Of State Board of Agriculture.

J. T. JOHNSON, HANCOCK COUNTY,
Of State Horticultural Society.

H. B. GURLER, DE KALB COUNTY,
Of State Dairymen's Association.

EMORY COBB, KANKAKEE.

BURDEN PULLEN, CENTRALIA.

PROF. GEORGE E. MORROW, AGRICULTURIST.

PROF. T. J. BURRILL, HORTICULTURIST AND BOTANIST.

PROF. WILLIAM McMURTRIE, CHEMIST.

THOMAS F. HUNT,
Assistant Agriculturist.

GEORGE W. McCLUER,
Assistant Horticulturist.

JOHN A. MILLER,
Assistant Chemist.

W. L. PILLSBURY,
Secretary.

LIST OF STUDENTS.

RESIDENT GRADUATES.

NAME.	RESIDENCE.
Ayers, Nettie B. L.	Urbana.
Gill, Rudolph Z.	Urbana.
Parr, Samuel W. B. S.	Jacksonville.
Petty, George R.	Pittsfield.
Williamson, Mary H. B. L.	Champaign.

SENIOR CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
*Baker, Frank D.	Mechanical Engineering	Wilmington.
Beadle, J. Grant	Architecture	Kewanee.
Bing, Benjamin	Chemistry	Urbana.
Bopes, Charles A.	Agriculture	Hamlet.
Bowditch, Fred'ck D.	Literature & Science & Mil.	Urbana.
*Briggs, C. Wesley	Literature and Science	Champaign.
Bryant, William C.	Architecture	Holton, Kan.
Bush, Lincoln	Civil Engineering	Orland.
Carter, Truman P.	Natural History	Jacksonville.
Davis, Frank L.	Architecture and Military	Latham.
Dewey, Ralph E.	Literature and Science	Penfield.
Ellison, Edward E.	Civil Engineering & Military	Edwardsville.
*Evans, Rolla W.	Architecture	Bloomington.
Folger, Adolphus	Natural History	Ridge Farm.
Frederick, Grant	Literature and Science	Clarence.
Goldschmidt, Alf'd G.	Mechanical Engineering	Davenport, Ia.
Goodell, Nathan P.	Literature and Science	Loda.
Greaves, George	Mining Engineering	Aurora.
Grindley, Harry S.	Agriculture	Champaign.
McHugh, George B.	Chemistry and Military	Urbana.
Myers, George W.	Literature and Science & Mil.	Urbana.
*Parker, Harry	Civil Engineering	Princeton.

NOTE.—A star (*) indicates that a student has not secured the full number of credits belonging to the class in which he is enrolled. He may have fallen behind this class, or he may have advanced beyond the class below.

NAME.	COURSE.	RESIDENCE.
Patton, Jacob A.	Chemistry and Military	Charleston.
Pickard, Edward W.	Ancient Languages & Military	Urbana.
Place, Raymond M.	Literature and Science	Atlanta.
Roberts, Warren R.	Civil Engineering	Sadorus.
Samuels, Jonathan H.	Mechanical Engineering & Mil.	Moline.
Schaefer, John V. E.	Mechanical Engineering	Granville.
Speidel, Hugo	Civil Engineering & Military	Rock Island.
Taylor, John W.	Civil Engineering	Charleston.
Van Gundy, Chas. P.	Chemistry	Springfield.

LADIES.

NAME.	COURSE.	RESIDENCE.
Barnes, Mary Lena	Literature and Science	Champaign.
Beach, Etta L.	Literature and Science	Champaign.
Connet, Ella	Literature and Science	Champaign.
Eldridge, Mary A.	Literature and Science	Galva.
Jillson, Nellie W.	Literature and Science	Pittsburgh, Pa.
McLean, Nellie	Literature and Science	Urbana.
McLellan, Mary C.	Literature and Science	Champaign.
Mathers, Effie	Natural History	Mason City.
*Paine, Leanah J.	Literature and Science	Orizaba.
Stoltey, Ida M.	Literature and Science	Champaign.

JUNIOR CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Bennett, Cleaves	Ancient Languages	Mattoon.
Bennett, Freder'k M.	Literature and Science	Atlanta.
*Bevis, Philemon	Architecture	Virginia.
Carver, Albert	Natural History and Military	Springfield.
*Coen, George H.	Natural History	Washburn.
Daugherty, Lewis S.	Natural History	Urbana.
*Davis, Elmer E.	Literature and Science	French Grove.
*Dunaway, Horace	Civil Engineering	Ottawa.
*Holly, William D.	Mechanical Engineering	Hubbell, Neb.
*Jones, Harry	Mechanical Engineering	Parnell.
*Keene, Edward S.	Mechanical Engineering	Moline.
Kendall, Harry F.	Literature and Science	Newton.
*Kinder, David R.	Literature and Science	Litchfield.
*Kinkead, David R.	Mechanical Engineering	Earlville.

NAME.	COURSE.	RESIDENCE.
Lewis, Almon	Architecture	Joliet.
*Ligare, Edward F.	Mining Engineering	Glencoe.
*McCandless, Wal'ce	Mechanical Engineering	Orion.
McConney, Robert B.	Mechanical Engineering	Sadorus.
*McKee, Willie E.	Mechanical Engineering	Rising.
Peoples, U. J. Lincoln	Architecture	Allegheny City, Pa.
*Proctor, Orla	Literature and Science	Rome.
Ross, Luther S.	Natural History	Reno.
*Shamel, Charles H.	Chemistry	Willey.
*Stauduhar, Geo. P.	Architecture	Mahomet.
Steele, Philip	Mechanical Engineering	Pittsford, Vt.
Talbot, George S.	Civil Engineering	Cortland.
Troyer, William L.	Agriculture	Dorchester, Neb.
*Walker, Arthur E.	Chemistry	Champaign.
*Warren, John B. Jr.	Civil Engineering	Hyde Park.
Weis, Herman L.	Mechanical Engineering	Tonica.
Weston, Nathan A.	Literature and Science	Champaign.

LADIES.

NAME.	COURSE.	RESIDENCE.
Boyle, Annie C.	Literature and Science	Champaign.
Bronson, Lilly O.	Literature and Science	Urbana.
Church, Blanche A.	Literature and Science	Atlanta.
Coffeen, Amy	Literature and Science	Champaign.
*Dewey, Helena M.	Literature and Science	Penfield.
*Hodges, Frances E.	Literature and Science	Champaign.
*Paine, Sarah M.	Natural History	Orizaba.
Sparks, Myrtle E.	Ancient Languages	Champaign.
*Weston, Margaret	Literature and Science	Champaign.
*Willis, Mary B.	Literature and Science	Champaign.

SOPHOMORE CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
*Barnes, John	Architecture.	Joliet.
Barr, James	Mechanical Engineering & Mil.	Urbana.
Bawden, Samuel D.	Mechanical Engineering & Mil.	Champaign.
*Beachem, Charles	Literature and Science	Gifford.
Beardsley, John	Literature and Science	Champaign.

NAME.	COURSE.	RESIDENCE.
Benson, Edward M.	Civil Engineering	Colfax.
*Bunton, Fred L.	Mechanical Engineering	Kewanee.
Camp, Norman H.	Natural History	Chanute, Kan.
Chapman, Arms S.	Literature and Science.	Danforth.
Clark, Frank H.	Mechanical Engineering & Mil.	Urbana.
Clark, Thomas A.	Literature and Science.	Champaign.
Clarke, Herbert B.	Mechanical Engineering	Peoria.
Clarkson, James F.	Civil Engineering & Military	Chicago.
Clinton, George P.	Natural History	Polo.
Cooke, Robert J.	Civil Engineering & Military	East Newbern.
Cornelison, Rob't W.	Chemistry	Washington.
Crabbs, Clarence L.	Civil Engineering & Military	Gibson City.
*Eidmann, Edw'd C.	Civil Engineering	Mascoutah.
*Ellis, Greek E.	Civil Engineering	Riverton, Ia.
Fisher, Frank	Civil Engineering & Military	Indianola.
†Flanigan, Wm. T.	Agriculture	White Heath.
Fraser, Herbert A.	Natural History	Plainfield.
*Frederickson, Wm. J.	Literature and Science	Champaign.
*Fuller, James R.	Civil Engineering	Buda.
Gelder, Tolman T.	Literature and Science	Virden.
Gilliland, William M.	Mechanical Engineering	Coatsburg.
*Haley, George S.	Mechanical Engineering	Buda.
*Hanssen, G. Adolph	Architecture	Davenport, Ia.
Hazleton, Hugh	Mechanical Engineering & Mil.	Forest Glen.
*Lewis, G. Felix	Mechanical Engineering	Washington.
Lewis, James L.	Literature and Science & Mil.	Tuscola.
*McIntyre, Wm. B.	Ancient Languages	Ransom.
Manny, Walter I.	Literature and Science	Mound Station.
*Moles, John W.	Literature and Science	Brimfield.
Moore, Byron L.	Chemistry	Champaign.
Nesbit, Edwin	Mechanical Engineering	Charleston.
*Parker, Hervey E.	Architecture	Champaign.
Piper, Edward D.	Mechanical Engineering	Chicago.
*Powell, John H.	Civil Engineering	Shawneetown.
Schaefer, Philem'n A.	Civil Engineering	Parral, Mexico.
*Shamel, Clarence A.	Agriculture	Willey.
*Smith, Harry J.	Mechanical Engineering	Allegheny City, Pa.
*Snyder, C. Henry	Civil Engineering	Fulton.
*Sprague, Edwin B.	Literature and Science	Bement.

† Died, April 4.

NAME.	COURSE.	RESIDENCE.
Stevens, Fred W.	Agriculture	Odell.
Storer, Frederic E.	Architecture and Military	Spring Ranch, Neb.
Terbush, Linsley F.	Literature and Science	Champaign.
Terrill, Joseph S.	Natural History	Champaign.
*Thomas, Marion E.	Civil Engineering	Bellmore, Ind.
Tresise, Frank J.	Civil Engineering & Military	Sharon, Pa.
Tscharner, John B.	Civil Engineering	Okawville.
Vennum, Fred D.	Literature and Science	Watseka.
Walter, Benjamin F.	Mechanical Engineering & Mil.	Maroa.
Waterman, Fred W.	Mechanical Engineering & Mil.	Sycamore.
Wheeler, Raymo'd O.	Architecture	Chicago.
White, James M.	Architecture & Military	Peoria.
Wilber, Frank D.	Literature and Science.	Champaign.
Wilkinson, George E.	Mechanical Engineering & Mil.	Argenta.
Wood, Robert A.	Mechanical Engineering & Mil.	Woodburn.

LADIES.

NAME.	COURSE.	RESIDENCE.
Bardwell, Ellen M.	Literature and Science.	Champaign.
Clark, Edith L.	Literature and Science	Urbana.
Ellars, Jessie	Ancient Languages	Tuscola.
*Harris, Jessica V.	Natural History	Kalamazoo, Mich.
Jones, Mabel	Literature and Science	Champaign.
Kennard, Kate L.	Literature and Science	Champaign.
Maxwell, Nellie	Literature and Science	Champaign.
*Moss, Minnie	Literature and Science	Champaign.
*Shattuck, Edith A.	Architecture	Champaign.
Sim, M. Eva	Literature and Science	Urbana.
Stevens, Geralda M.	Literature and Science	Champaign.

FRESHMAN CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Barclay, Thomas	Chemistry	Plainfield,
Beckwith, Frank	Civil Engineering & Mil.	Quincy.
*Bond, Richard H.	Civil Engineering	Jacksonville.
*Bouton, Charles S.	Mechanical Engineering	Hyde Park.
Boyd, Willard A.	Mechanical Engineering & Mil.	Lewistown.

NAME.	COURSE.	RESIDENCE.
Braucher, Ernest N.	Architecture	Lincoln.
Brueggemann, Geo.	Mining Engineering	Belleville.
Chester, D. Hubert	Agriculture and Military	Champaign.
Chester, John N.	Civil Engineering	Champaign.
*Chipron, Francis	Mechanical Engineering	Highland.
Clarke, Edwin B.	Architecture and Military	Quincy
Clarke, Frederic W.	Architecture and Military	Quincy.
*Culter, Charles C.	Civil Engineering	Florid.
Darby, Will E.	Literature and Science	Urbana.
*Dinwiddie, Edwin	Mechanical Engineering	Maroa.
*English, Nathaniel	Civil Engineering	Jacksonville.
Eno, Frank H.	Civil Engineering & Military	Pomona, Cal.
Fischer, Jacob	Chemistry	Oregon.
Fischer, Lawrence	Architecture and Military	Oregon.
Frahm, Hans	Literature and Science	Tuscola
Frederickson, Jno. H.	Civil Engineering	Champaign.
French, Ransford M.	Architecture	Pana.
*Furst, Oliver B.	Mechanical Engineering	Peoria.
Gardner, Frank D.	Agriculture	Gilman.
Gibson, Charles	Civil Engineering	South Grove.
Godfrey, David E.	Natural History & Military	Philo.
Green, Thomas S.	Natural History	Jacksonville.
*Hambleton, Art'r R.	Chemistry	Keokuk, Ia.
*Harms, Ernst	Civil Engineering	Rock Island.
Harris, Jay T.	Architecture	Champaign.
*Harris Wm. H.	Mechanical Engineering	Seymour
Harvey, Alfred E.	Civil Engineering	Paris.
Hay, Walter M.	Civil Engineering & Military	Sandwich.
Helm, Harry S.	Architecture	Rockford.
*Hicks, Preston T.	Civil Engineering	Warren.
Hildrup, James J.	Civil Engineering	Belvidere.
Howorth, Thomas J.	Literature and Science	Chester.
Ingels, Henry G.	Mechanical Engineering	Chatham.
Jerrey, Edward E.	Civil Engineering	Curran.
Klingelhoefer, Wm.	Civil Engineering	Mascoutah.
*Leonard, Emmer A.	Mechanical Engineering	Tremont.
Lockhart, John W.	Mechanical Engineering & Mil.	Owensville, Ind.
McClure, Ora D.	Mechanical Engineering & Mil.	Gibson City.
McCormick, Thos. P.	Mechanical Engineering	St. Louis, Mo.
Merritt, Charles J.	Mechanical Engineering	Champaign.

NAME.	COURSE.	RESIDENCE.
Mitchell, Charles J.	Civil Engineering and Military	Fulton.
*Moulton, Wm. H.	Civil Engineering	Waverly.
*Naughton, Frank U.	Architecture	Champaign.
*Orr, Edward E.	Architecture	Quincy.
*Parkman, Chas. C.	Architecture	Philo.
Pillsbury, Ithamar.	Mining Engineering	Macomb.
*Provine, Ralph	Architecture	Paris, Texas.
*Radebaugh, Otis B.	Architecture	Urbana.
*Reat, Samuel C.	Literature and Science	Tuscola.
Richart, Fred'ck W.	Mechanical Engineering	Carterville.
*Ricketson, Geo H.	Civil Engineering	Sugar Grove.
Rogan, Jonathan A.	Civil Engineering	Decatur.
*Russell, Frank S.	Literature and Science	St. Joseph.
*Sanders, Geo. L.	Mechanical Engineering	Waterloo, Ia.
Schroeder, Wm. E.	Natural History	Chicago.
Shattuck, Walter F.	Architecture	Champaign.
*Siebernes, John R.	Mechanical Engineering	Peoria.
Smolt, Franklin O.	Chemistry and Military	Paw Paw.
*Sperry, Eldridge H.	Architecture	Champaign.
*Sperry, William L.	Architecture.	Champaign.
Taft, Frank H.	Mechanical Engineering & Mil.	Sadorus.
Tubbs, Henry R.	Literature and Science	Kirkwood.
Vail, Charles D.	Civil Engineering & Military	Lone Tree.
*Vulliet, Francis L.	Civil Engineering	Highland.
Wait, Burton C.	Mechanical Engineering & Mil.	Pontiac.
Wallace, R. Strawn	Mechanical Engineering & Mil.	Pontiac.
Whitaker, Dick R.	Mechanical Engineering	Peru.
*Wilhelm, Augustus	Architecture	Cincinnati, O.
Williamsou, Frank R.	Civil Engineering	St. Anne.
*Yamada, Sitzuro	Agriculture	Wakamaten, Japan.
Yoho, Marquis R.	Natural History	Georgetown.
Young, Charles B.	Architecture	Aurora.

LADIES.

NAME.	COURSE.	RESIDENCE.
*Beach, Jessie	Natural History	Champaign.
Beach, Laura M.	Natural History	Champaign.
Broaddus, Alice V.	Natural History	Henry.
Carson, Anne	Literature and Science	Urbana.
*Cunningham, Clara	Natural History	Champaign.

NAME.	COURSE.	RESIDENCE.
*Fisher, Virginia B.	Literature and Science	Ridge Farm.
Jones, Izabelle E.	Natural History	Champaign.
McWatty, Mattie M.	Natural History	Champaign.
Pickard, Ethel M.	Literature and Science	Urbana.
Royer, Anna E.	Literature and Science	Urbana.
Sibert, Emma E.	Literature and Science	Jacksonville.
*Van Vleck, Mary B.	Natural History	Philo.

PREPARATORY CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Aranda, Ezequiel	Mechanical Engineering	Allende, Mexico.
Armstrong, James L.	Ancient Languages	Hayes.
Arnold, Andrew H.		Yorkville.
Baker, Albert H.		Stillman Valley.
Baker, John P.	Civil Engineering	Parkersburg, Ia.
Beuthien, Arnold	Civil Engineering	Durant, Ia.
Bitner, John E.	Natural History	Rosefield.
Blair, Edgar	Agriculture	Plymouth.
Blaisdell, Irwin R.		Champaign.
Boerckel, Samuel	Civil Engineering	Peoria.
Boggs, Franklin H.	Literature and Science	Hayes.
Bowker, Ernest S.	Mechanical Engineering	Gibson City.
Bullock, J. Mason		Tonica.
Butler, Wm. T.	Civil Engineering	Franklin, O.
Campbell, Michael K.	Literature and Science	Lewistown.
Carnahan, Frank G.		Champaign.
Church, Ralph D.	Mechanical Engineering	Sterling.
Clark, Ezra J.	Literature and Science	Urbana.
Clark, Geo. W. Jr.		Jacksonville.
Clark, Harry T.		Paris.
Cody, Richard J.	Literature and Science	Chicago.
Coffeen, Fred G.		Champaign.
Conkling, Harry W.		Champaign.
Cook, Will F.	Natural History.	Mendota.
Crissey, John W.	Civil Engineering	Chester.
Culbertson, Ervin	Agriculture	White Hall.
Devol, Arthur W.	Mechanical Engineering	Otterville.

NAME.	COURSE.	RESIDENCE.
Digby, Arthur		Barry.
Dresbach, Joseph F.	Literature and Science	Mayview.
Eastman, Charles E.	Architecture	Petersburg.
Eberhard, John J.		Chicago.
Ellars, Orlie L.		Arthur.
Ellis, Lilburn B.	Civil Engineering	Ridge Farm.
Evans, Arthur		Mt. Vernon.
Everett, Uz.	Mechanical Engineering	Philo.
Full, George C.		St. Joseph.
Funston, Edmund B.	Architecture	Fisher.
Furry, Charles V.	Ancient Languages	Virden.
Givan, James W.	Chemistry	White Hall.
Hall, Fred A.		Tonica.
Hall, Lyman	Chemistry	Savoy.
Hall, Tracy Q.		Lacon.
Harris, B. Frank	Literature and Science	Champaign.
Hobbs, Glen M.		Yorkville.
Hoblit, Merritt L.	Literature and Science	Aurora, Neb.
Horn, Thomas	Agriculture	Du Quoin.
Hottes, Charles F.	Natural History	Mascoutah.
Howe, James H.		Ficklin.
Huff, George A. Jr.	Literature and Science	Englewood.
Hughes, John W.	Literature and Science	Pierson.
Kellogg, Edwin F.		Champaign
Kiefer, Albert	Architecture.	Peoria.
Kreider, John M.		Jacksonville.
Lowe, Lloyd C.	Architecture	Bridgeport, W. Va.
McCormick, Wirt	Literature and Science	Mahomet.
Martin, William A.	Mechanical Engineering	Chicago.
Maue, August	Literature and Science	Mokena.
Merrifield, Albert W.	Civil Engineering	Ottawa.
Morse, Burt	Architecture	Rapatee.
Mudge, Charles H.	Agriculture	Peru.
Nesbitt, George W.		Sycamore.
Outcalt, Irvin E.	Literature and Science	Champaign.
Palmer, Frederick N.	Agriculture	Clinton.
Palmer, John G.		Sterling.
Patton Otto C.		Mt. Vernon.
Pavey, Lou		Mt. Vernon.
Phillips, James D.		Englewood.

NAME.	COURSE.	RESIDENCE.
Pierce, Charles I.	Mechanical Engineering	Kewanee.
Pillars, Charles		Champaign.
Pillsbury, Louis L.		Pontiac.
Rich, Robert L.		Alto Pass.
Salter, Ernest W.		Kirkwood.
Sandford, Wm. E.	Chemistry	Kewanee.
Shamel, John Y.		Willey.
Shannon, James S. Jr.	Architecture	Hinsdale.
Smith, Ethiel B.		Forrest.
Smith, Howard T.		Elgin.
Smith, Martin A.	Mechanical Engineering	La Moille.
Swigert, Arthur W.	Architecture	Springfield.
Tackett, William	Literature and Science	Sadorus.
Towner, Frank M.	Mechanical Engineering	Champaign.
Tscharner, Frank P.	Literature and Science	Okawville.
Wagner, Joseph		Spring Bay.
Watson, Harry W.		Mt. Vernon.
Whittemore, Harry M.		Sycamore.
Wilkinson, Charles E.		Argenta.
Williams, Warren		Camp Point.
Wilson, John		Niota.
Woodworth, Howard O.	Natural History	Champaign.

LADIES.

NAME.	COURSE.	RESIDENCE.
Ashley, Hattie E.	Literature and Science	Gibson City.
Barber, Alice M.	Natural History	La Fox.
Boomer, DeEtta		Philo.
Butterfield, Helen M.	Literature and Science	Champaign.
Coen, Mary E.		Washburn.
Darby, Nelli M.	Literature and Science	Urbana.
Folger, Rachel E.	Natural History	Ridge Farm.
Gayman, Emma	Natural History	Champaign.
Gould, Mabel C.	Literature and Science	West Plains, Kan.
Heller, Opal B.	Literature and Science	Urbana.
Mitchell, Olive.	Natural History	Bement.
Myers, Clara	Literature and Science	Newport, Ind.
Sherfy, Fanny B.	Literature and Science	Champaign.
Smith, Ellen A.	Architecture	Tamaroa.

SPECIALS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Boyer, Emanuel R.	Biology	Champaign.
Douglas, Charles L.	Agriculture	Marseilles.
Durrett, Charles M.	Architecture	Memphis, Tenn.
Gilmore, Charles P.	Agriculture	New Boston.
Hall, Henry G.	Art and Design	Savoy.
Hammett, Chas. B.	Agriculture	Camargo.
Hunt, Guy T.	Agriculture	Urbana.
Leonard, Elmon L.	Agriculture	Tremont.
Lindsay, George W.	Veterinary Science	Urbana.
Northam, George A.	Agriculture	Nora.
Read, George H.	Agriculture	Lilly Lake.
Rubush, Preston C.	Architecture	Indianapolis, Ind.
Scheve, Julius L.	Architecture	Mascoutah.
Slater, H. Herbert	Architecture	Woodburn.
Wilson, Luther M.	Agriculture	Shelbyville.

LADIES.

NAME.	COURSE.	RESIDENCE.
Carnahan, Ada W.	Art and Design	Champaign.
Cyrus, Annie	Art and Design	Camp Point.
Dewey, Antoinette	Art and Design	Penfield.
Gill, Blanche A.	Art and Design	Champaign.
Hart, Lydia M.	Art and Design	Champaign.
Hill, Mrs. Mary	Art and Design	Champaign.
Lindley, Bertha	Music	Philo.
Lloyde, Mrs. Frances	Art and Design	Champaign.
Maloney Mary M.	Art and Design	Washburn.
Moore, Grace	Art and Design	Champaign.
Morris, Flora E.	Art and Design	Urbana.
Morrow, Minnie M.	Art and Design	Champaign.
Wilber, Ella	Art and Design	Champaign.

SUMMARY.

BY CLASSES.	GENTLEMEN.	LADIES.	TOTAL.
Resident Graduates	3	2	5
Seniors	31	10	41
Juniors	31	10	41
Sophomores	59	11	70
Freshmen	77	12	89
Preparatory	89	14	103
Special	15	13	28
Total	305	72	377
BY COURSES.			
Agriculture	23		23
Mechanical Engineering	57		57
Civil Engineering	53		53
Mining Engineering	4		4
Architecture	44	2	46
Chemistry	15		15
Natural History	20	14	34
Art and Design	1	13	14
English and Modern Languages	46	39	85
Ancient Languages	6	2	8
Not Specified	37	2	39
Total	305	72	377

UNIVERSITY OF ILLINOIS.

HISTORY.

The University of Illinois had its origin in a movement for the higher education of the industrial classes, begun in 1851, and resulting in the congressional grant of lands for this purpose, made to the several States in 1862, and amounting in this State to 480,000 acres. The University was chartered in February, 1867, and opened to students in March, 1868. In addition to the endowment from the land grant, over $400,000 were donated by Champaign county in bonds, buildings, and farms. The State also has made large appropriations for fitting up and stocking the farms, for library and apparatus, and for buildings, including the large Main building erected in 1872 and 1873, the Mechanical Building and Drill Hall, and the Chemical Laboratory. Successive Colleges and schools have been added as required, until four Colleges, including eleven distinct Schools, have been organized.

The whole number matriculated as students since the opening is 2,224. The number graduated from the several Colleges, including the class of 1886, is 510. In 1871 the University was opened for lady students, on the same terms as to gentlemen. In 1874 a Fine Art Gallery was established. In 1876 the University received from the Centennial Exposition at Philadelphia, three diplomas and a medal. In 1877 its exhibit at the Paris International Exposition gained a diploma and the gold medal.

LOCATION.

The University has a beautiful and healthful situation on the high grounds between the cities of Champaign and Urbana, and within the corporate limits of the latter. It is one hundred and twenty-eight miles south from Chicago,

at the junction of the Illinois Central, the Ohio, Indiana and Western, and the Wabash railways. The country is a region of beautiful rolling prairies, with large belts of timber along the streams, and is one of the richest farming districts in the State.

BUILDINGS AND GROUNDS.

The domain occupied by the University and its several departments, embraces about 623 acres, including stock farm, experimental farm, orchards, nurseries, forest plantation, arboretum, ornamental grounds, and military parade grounds.

The University buildings, fifteen in number, include a grand Main Building, a spacious Mechanical Building and Drill Hall, a large Chemical Laboratory, a Veterinary Hall, a small Astronomical Observatory, two dormitories, three dwellings, two large barns, and a green-house.

The Main University Building, designed wholly for public uses, occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. The Library wing is fire proof, and contains in spacious halls the Museum of Natural History, the Library, the Art Gallery, and the Museum of Industrial Art. The Chapel wing contains the Chapel, the Physical Laboratory and Lecture Room, and rooms for draughting and drawing. In the main front are convenient class-rooms; on the upper floor, elegant halls for literary societies. The building is warmed by steam from a boiler-house which forms the fourth side of the quadrangle in the rear.

The Mechanical Building and Drill Hall is of brick, 126 feet in length, and 88 feet in width. It contains a boiler-room, a machine shop, furnished for practical use with a steam engine, lathes, and other machinery; pattern and finishing shop; shops for carpentry and cabinet-work, furnished with wood-working machinery; paint and draughting rooms, and rooms for models, storage, etc. An addition built lately for a blacksmith shop, 32 by 36 feet, contains sixteen forges with anvils and tools, and a cupola for melting iron. In the second story is the large Drill Hall, 124 by 80 feet, sufficient for the evolutions of a company of infantry or a section of a battery of field artillery. It is also supplied with gymnastic apparatus. One of the towers contains an armorer's shop

and an artillery room; the other contains a printing office and editor's room.

The Chemical Building, erected in 1878, at a cost, including furniture, of $40,000, contains five laboratories, and is one of the best and largest in the United States.

PROPERTY AND FUNDS.

Besides its lands, buildings, furniture, library, etc., valued at $400,000, the University owns 16,000 acres of well selected lands in Minnesota and Nebraska. It has also endowment funds invested in State and County bonds amounting to over $450,000.

MUSEUMS AND COLLECTIONS.

The Museum of Zoölogy and Geology occupies a hall 61 by 79 feet, with a gallery on three sides, and is completely furnished with wall, table, and alcove cases. It already contains interesting and important collections, equaled at few, if any, of the colleges of the West. They have been specially selected and prepared to illustrate the courses of study in the school of natural history, and to present a synoptical view of the zoölogy of the State.

Zoölogy.—The mounted *mammals* comprise an unusually large and instructive collection of the ruminants of our country, including male and female moose and elk, bison, deer, antelope, etc.; and, also, several quadrumana, large carnivora and fur-bearing animals, numerous rodents, and good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens.

The collection of mounted *birds* (about five hundred specimens of two hundred and forty species) includes representatives of all the orders and families of North America, together with a number of characteristic tropical forms. Many of these specimens are excellent examples of artistic taxidermy. A series of several hundred unmounted skins is available for the practical study of species.

The set of *skeletons* contains examples of all the orders of mammals and birds except Proboscidea, together with typical representatives of the principal groups of reptiles, amphibians, and fishes.

The *cold-blooded vertebrates* are also illustrated by a very useful collection of alcoholic specimens, plaster casts, and mounted skins of the larger species, both interior and marine.

Conchology is illustrated by several thousand shells belonging to seventeen hundred species; together with alcoholic specimens of all classes and orders. The collection of Illinois shells is creditable, although incomplete.

The *entomological cabinet* contains about three thousand species (principally American) named, labelled, and systematically arranged. The *lower invertebrates* are represented by several hundred dried specimens and aloholics, and by a large series of the famous Blaschka glass models.

Geology.—The geological collection comprises many of the largest and most remarkable fossils hitherto discovered in the various geological formations, illustrating the general progress of life in the mollusks, fishes, reptiles, and mammals, from the oldest palæozoic time to the present. A fine set of fossils from Germany, and collections, suitably arranged for practical study, from this and other States, illustrate the different formations. There is a good collection of foot-prints from the Connecticut river sand-stones.

In *Entomology* numerous species have been contributed by the State Entomologist, who is required by law to deposit his first series of specimens in the cabinet of the University. Local collections and exchanges have increased the number to about three thousand species. The establishment at the University of the office of the State Entomologist of Illinois makes available to students of this subject the entomological library and the collections of that office, and affords an extraordinary opportunity for observation of the methods of work and research in economic entomology.

Botany.—The herbarium contains about one thousand species of plants indigenous to Illinois, including nearly complete sets of grasses and sedges. There are, besides, many other North American plants and some exotics. A collection of Fungi, includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees, well illustrates the varieties of native wood. The trees and shrubs of Stephenson county, Illinois, are represented by a distinct collection.

Plaster casts represent fruits of many of the leading varieties, as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

Lithology.—This collection embraces the principal kinds of metamorphic and volcanic rocks; examples of stratification in the limestone and fragmental kinds, with many samples of such rocks as are found most valuable for building purposes.

Mineralogy.—The specimens of minerals show all the groups, and all the important and typical species. All the metals are represented, also many of their most important combinations. Many of the specimens are finely crystalized; these, with a complete set of imported models, fully illustrate crystalography.

Agricultural.—A large collection of soils from different portions of Illinois, and other States; many varieties of corn, wheat, and other cereals and seeds; specimens illustrating the official State Inspection of grains at Chicago, showing the quality of the different grades recognized; a collection of grains, seeds, nuts, etc., from Brazil; some hundreds of models of agricultural inventions; models illustrating modes and materials for drains; casts of ancient plows; engravings, lithographs, and photographs of typical animals of noted breeds.

The farms give good illustrations of farm buildings, implements, machinery, modes of culture, and of domestic animals of various classes.

Physics.—The Cabinets of the Physical Laboratory contain a collection of apparatus from the most celebrated European and American makers, illustrating the subjects of Mechanics, Pneumatics, Optics, and Electricity. Ample facilities are afforded to students for performing experiments of precision by which the theories of Physical Science may be tested and original work may be done.

A five-light Weston dynamo at the machine shop is connected with the physical and chemical laboratories for experimental purposes, and is supplemented by a valuable series of instruments for accurate electrical measurements.

A series of standard weights and measures from the office of the Coast and Geodetic Survey of the United States Government may be consulted at the Physical Laboratory.

The Mechanical Laboratory is provided with a steam engine, engine and hand lathes, planer, shapers, milling-machine, drill presses, and the requisite hand tools, benches, vises, anvils, etc., for pattern-shop, blacksmith shop, moulding-room and bench work. Its cabinets contain several hundred models of elements of mechanism and machines from Schroeder, Riggs, the patent-office, and from the work-shops of the University. Important additions to the equipment of tools and machines have lately been made, including a Testing Ma-

chine of most approved design, having a capacity of 100,000 pounds, and a mercury column for accurate testing of water and steam-gauges.

Mining Engineering is illustrated by a valuable series of models, obtained from Freiburg, illustrating sections of mines, machinery for elevating and breaking ore, with furnaces and machinery for metallurgical processes.

An extensive mining and metallurgical laboratory is in process of arrangement. A considerable portion of the machinery is already in working condition.

ART GALLERY.

The University Art Gallery is one of the largest and finest in the West. It was the gift of citizens of Champaign and Urbana. It occupies a beautiful hall, 61 by 79 feet, and the large display of Art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full-size casts of celebrated statues, including the Laocoön group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over 400 pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools. Aiso a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France. The value of this splendid collection, as a means of education, is shown in the work of the School of Drawing and Design of the University.

MUSEUM OF INDUSTRIAL ARTS.

A large room is devoted to the gathering of a museum of practical art, the materials for which are conatantly accumulating in the various schools of science. It contains full lines of illustrations of the work of the shops; models made at the University or purchased abroad; drawings in all departments; patent-office models, etc.; samples of building materials, natural and artificial; a large collection illustrating the forestry of Illinois, Florida, and California; with whatever may be secured that will teach or illustrate in this most important phase of University work; the elegant exhibit made by the University at the Centennial and Cotton Exposition at New Orleans finds a permanent abode in this apartment.

A notable feature of this collection is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster, and a complete set of drawings, of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first King of Italy. The monument was to be of white marble, an elaborate gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter million of francs. The design was placed by the art committee second on a list of 289 competitors: but both the first and second were set aside for political reasons. Mr. Gay's generous gift occupies the place of honor in the Museum of Industrial Arts.

LIBRARY.

The Library selected with reference to the literary and scientific studies required in the several courses, includes over 17,000 volumes, and additions are made every year.

The large library hall, fitted up as a reading-room, is open throughout the day for study, reading, and consulting authorities. It is intended that the use of the Library shall largely supplement the class-room instruction in all departments. Constant reference is made in classes to works contained in the Library, and their study is encouraged or required. The reading room is well provided with American, English, French, and German papers and periodicals, embracing some of the most important publications in science and art. The following periodicals are regularly received:

PERIODICALS IN THE LIBRARY, 1888.

AGRICULTURAL AND HORTICULTURAL.

Prairie Farmer.
Western Rural.
Country Gentleman.
Breeder's Gazette.
Indiana Farmer.
Agricultural Gazette, *London.*
Gardeners' Chronicle, *London.*
American Agriculturist.
Western Agriculturist.
Live Stock Journal, monthly and weekly.
Farmers' Review.
Veterinary Journal.
Industrialist.
Farm, Field and Stockman.
Rural New Yorker.
Fruit Growers' Journal.
American Garden.
Southern Cultivator.
Agricultural Science.
Wisconsin Agriculturist.
Farm and Home.
Farmers' Call.
Short Horn Journal.
Rural World.
American Florist.
Hoard's Dairyman.
Hellenike, Georgia.

ENGINEERING.

Builder, *London*.
American Engineer.
Transactions American Society of Civil Engineers.
Engineering News.
Engineering and Mining Journal.
Scientific American.
Scientific American Supplement.
Sanitary Engineer.
Railroad and Engineering Journal.
American Architect.
American Machinist.
Western Manufacturer.
Gazette of Patent Office.
Mechanics.
Locomotive.
American Artisan.
School of Mines, quarterly.

SCIENTIFIC.

Annales des Sciences Naturelles, Botanique, *Paris*.
Annales des Sciences Naturelles, Zoologie, *Paris*.
Science.
Nature, *London*.
American Naturalist.
Grevillea, *London*.
Decorator and Furnisher.
Art Amateur.
Portfolio, *London*.
Comptes Rendus, *Paris*.
Chemical News, *London*.
Journal of Chemical Society, *London*.
American Journal of Chemistry.
Annals and Magazine of Natural History, *London*.
Boston Journal of Chemistry.
Jahrbericht der Chemie, *Giessen*.
Zeitschrift fur An Chemie.
Berichte der Deutschen Chemischen Gesellschaft, *Berlin*.
Popular Science Monthly.
American Journal of Mathematics.
American Journal of Science and Art.
Journal of Franklin Institute.
Journal de Mathematiques.
Mathematical Quarterly.
Annals of Mathematics.
Monthly Weather Review.
Proceedings of American Philosophical Society.
Annales des Mines.
Revue d'Architecture.
Journal of Physiology.
Geological Magazine.

LITERARY AND NEWS.

Nineteenth Century.
Edinburg Review.
Contemporary Review.
Fortnightly Review.
North American Review.
Atlantic Monthly.
Century.
Dial.
Literary World.
Education.
Legal Adviser.
Revue des Deux Mondes, *Paris*.
Deutsche Rundschau, *Berlin*.
Congressional Record.
Champaign County Gazette.
Champaign Times.
Musical Record.
The Rock-Islander.
Witness.
English Historical Magazine.
Library Journal.
United States Government Publications.
Daily Illinois State Journal.
Voice (Elocution).
Chamber of Commerce Journal.

The exchanges of the *Illini* are also free to the students in the Library.

AIMS OF THE UNIVERSITY.

The University is both State and National in origin. Its aims are defined by the following extracts from the laws of Congress and the State Legislature:

"Its leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislature of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."—*Act of Congress 1862, Sec. 4.*

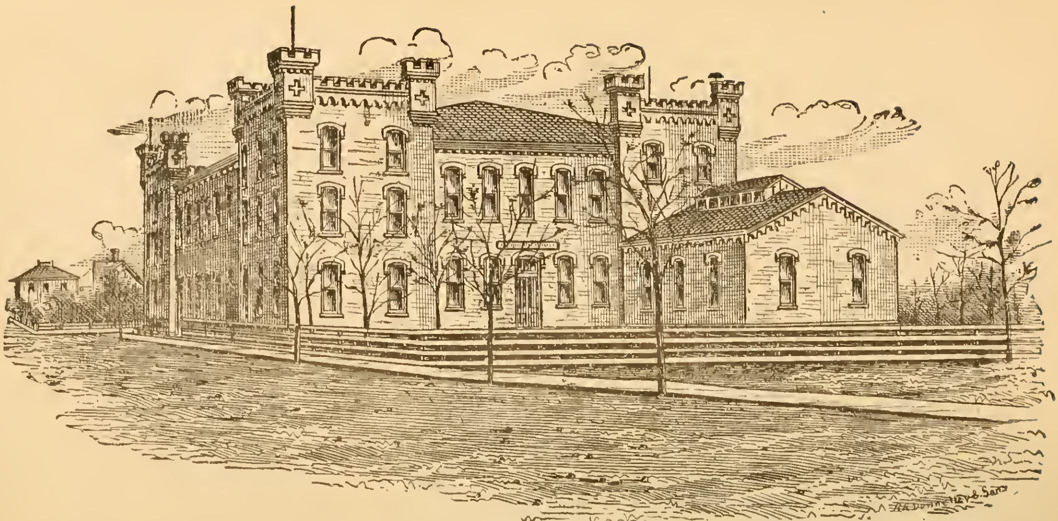
"The Trustees shall have the power to provide the requisite buildings, apparatus, and conveniences, to fix the rates of tuition, to appoint such professors and instructors, and establish and provide for the management of such model farms, model art, and other departments and professorships as may be required to teach, in the most thorough manner, such branches of learning as are related to agriculture and the mechanic arts, and military tactics, without excluding other scientific and practical studies."—*Act of General Assembly, 1867, Sec. 7.*

In accordance with the two acts above quoted, the University holds, as its principal aim, to offer freely the most thorough instruction which its means will provide, in all the branches of learning useful in the industrial arts, or necessary to "the liberal practical education of the industrial classes, in the several pursuits and professions in life." It includes in this all useful learning—scientific and classical,—all that belongs to sound and thorough scholarship.

ORGANIZATION OF THE UNIVERSITY.

COLLEGES AND SCHOOLS.

The Institution is a University in the American sense, though differing designedly in the character of some of its



DRILL HALL AND MACHINE SHOP

Colleges from the older institutions of this country. It embraces four Colleges, which are subdivided into Schools. A School is understood to embrace the course of instruction needful for some one profession or vocation. Schools that are cognate in character and studies, are grouped in the same College. The following are the Colleges and Schools:

I. COLLEGE OF AGRICULTURE.

II. COLLEGE OF ENGINEERING.

School of Mechanical Engineering.
School of Civil Engineering.
School of Mining Engineering.
School of Architecture,

III. COLLEGE OF NATURAL SCIENCE.

School of Chemistry. School of Natural History.

IV. COLLEGE OF LITERATURE AND SCIENCE.

School of English and Modern Languages.
School of Ancient Languages.

V. ADDITIONAL SCHOOLS.

School of Military Science. School of Art and Design.

Vocal and Instrumental Music are also taught, but not as parts of any regular course.

CHOICE OF STUDIES.

From the outset, the University has permitted great freedom in the selection of studies. It is, however, necessarily required: that the student shall be thoroughly prepared to enter and to keep pace with the classes in the chosen studies, and that he shall take these studies in the terms in which they are taught. *Candidates for a degree must take the course of study prescribed for that degree.*

Each student is expected to have three distinct studies, affording three class exercises each day. On special request, the Faculty may allow less or more.

No change in studies may be made after the beginning of a term without permisssion of the Faculty.

Due care will be taken to prevent, as far as possible, all abuse of the liberty of choice. Students failing to pass satisfactory examinations in their chosen studies, will not be per-

mitted to remain and take other studies without a vote of the Faculty.

REQUIRED STUDIES.

To secure the diffusion of the sciences relating to the great industries, the State Legislature, in 1873, prescribed that each student should be taught some of those sciences.

The Trustees accordingly require that each student shall take, each term, one study at least from the following list:

Physics, Chemistry, Mineralogy, Physiography, Anatomy and Physiology, Botany, Zoölogy, Geology, Entomology; Drawing and Designing, Mathematics, Surveying, Elements of Agriculture and Horticulture, Vegetable Physiology, Agricultural Chemistry, Agricultural Engineering and Architecture, Animal Husbandry, Rural Economy, Landscape Gardening, History of Agriculture, Veterinary Science; Architectural Drawing and Designing, Elements of Construction, Graphical Statics, History and Esthetics of Architecture, Estimates, Mining Engineering, Metallurgy, Analytical Mechanics, Geodesy, Principles of Mechanism, Hydraulics, Thermodynamics, Strength of Materials, Prime Movers, Mill Work, Machine Drawing, Roads and Railroads, Construction and Use of Machinery, Modeling and Patterns, Bridges, Stone Work, Astronomy; Military Science, Political Economy, Logic, and Mental Science.

EXAMINATIONS FOR ADMISSION.

Examinations of candidates for admission to the University, or any of its departments, are held at the University itself, on the two days previous to the opening of each term. These examinations embrace the following studies:

1. English Grammar, Arithmetic, Geography, and History of the United States, for all the Colleges. These examinations are as thorough as those required for second-grade certificates for teachers in the public schools.

2. Algebra, including equations of second degree and the calculus of radical qualities; Geometry, plain and solid. These are required also for all the Colleges.

3. Physiology, Botany, Natural Philosophy, English Rhetoric and Composition. These are required, in addition to the subjects specified in 1 and 2, for candidates for the Colleges of Agriculture, Engineering, and Natural Science.

4. Physiology, Botany, Natural Philosophy; Latin Grammar and Reader, Cæsar, Cicero, Virgil, and Latin Prose Composition, in addition to 1 and 2, for School of English and Modern Languages.

5. Latin (as in 4), Greek Grammar and Reader, four books of Xenophon's Anabasis, and Greek Prose Composition in addition to the subjects of 1 and 2, for candidates for School of Ancient Languages.

For further information concerning terms of admission, see "*Admission*" under the several Colleges; also, "*Preliminary year.*"

COUNTY SUPERINTENDENTS' CERTIFICATES.

To prevent loss to those who are not prepared to enter the University, but might come, hoping to pass the examinations for admission, the following arrangement has been made:

County Superintendents of Schools will be furnished with questions and instructions for the examination of candidates in the four common branches, Arithmetic, Geography, English Grammar, and History of the United States; applicants who pass creditably will, when they present the superintendent's certificate to that effect, be admitted to the classes of the Preliminary year.

HONORARY SCHOLARSHIPS.

The trustees have determined that examinations may be conducted in the several counties of the state by the county superintendents thereof, on the first Friday and Saturday of June next. The examinations are upon the subjects named above. They will be in writing, and the papers will be sent to the University to be passed upon by the officers there. The pupil in each county who obtains the highest average in this examination, but not less than 80, nor less than 75 in any one subject, will receive an HONORARY SCHOLARSHIP upon which he may attend the University for FOUR YEARS, free of charge *for tuition or incidental expenses.* There may be one scholarship for each county in the state. The total value of this scholarship to the successful candidate is $90.

Similar examinations may be held in June of each year in any county for which no Honorary Scholarship is held by any student.

COLLEGE OF AGRICULTURE.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, Ph. D., LL. D., Regent.
GEORGE E. MORROW, A. M., *Dean*, Agriculture.
THOMAS J. BURRILL, A. M., Ph. D., Botany and Horticulture.
SAMUEL W. SHATTUCK, A. M., C. E., Mathematics.
EDWARD SNYDER, A. M., Modern Languages.
JOSEPH C. PICKARD, A. M., English Language and Literature.
PETER ROOS, Industrial Art.
WILLIAM McMURTRIE, E. M., Ph. D., Chemistry.
STEPHEN A. FORBES, Ph. D., Entomology and Zoölogy.
JAMES H. BROWNLEE, A. M., Rhetoric and Oratory.
DONALD McINTOSH, V. S., Veterinary Science.
CHARLES W. ROLFE, M. S., Geology.
CURTIS B. HOPPIN, Lt. U. S. A., Military Science.
GEORGE W. PARKER, Woodwork.

ADMISSION.

Candidates for admission to the College of Agriculture must be at least fifteen years of age, and must pass satisfactory examinations in the common school branches and in the studies of the preliminary year. While by law, students may be admitted at fifteen years of age, in general it is much better that they shall be eighteen or twenty. It will be well if candidates shall have pursued other studies besides those required for admission. The better the preparation the more profitable the course.

OBJECT OF THE COLLEGE.

The aim of this College is to educate scientific agriculturists and horticulturists. The frequency with which this aim is misunderstood, demands that it shall be fully explained. Many, who look upon agriculture as consisting merely in the manual work of plowing, planting, cultivating, and harvesting, and in the care of stock, justly ridicule the idea of teaching these arts in a college. The practical farmer who has spent his life in farm labors, laughs at the notion of sending his son to learn these from a set of scientific professors. But all this implies a gross misunderstanding of the real object of agricultural science. It is not simply to teach *how* to plow, but the reason for plowing at all—to teach the composition and nature of soils, the philosophy of plowing, of manures, and the adaptation of the different soils to different crops and cultures. It is not simply to teach *how* to feed, but to show the composition, action, and value of the several kinds of food and the laws of feeding, fattening, and healthful growth. It short, it is the aim of the true Agricultural College to enable the student to understand thoroughly all that man can know about soils and seeds, plants and animals, and the influences of light, heat, and moisture on his fields, his crops, and his stock; so that he may both understand the reason of the processes he uses, and may intelligently work for the improvement of those processes. Not "book farming" but a knowledge of the real nature of all true farming—of the great natural laws of the farm and its phenomena—this is the true aim of agricultural education. Agriculture involves a larger number of sciences than any other human employment, and becomes a fit sequence to any collegiate training.

The steady aim of the trustees has been to give the College of Agriculture the largest development practicable, and to meet the full demand for agricultural education, as fast as it shall arise. Agricultural students are especially invited to the University.

Boards of Agriculture, and Agricultural and Horticultural Associations are invited to co-operate with the University in its efforts to awaken a more general appreciation of the value of education, and to aid those who desire to avail themselves of its facilities for instruction.

INSTRUCTION.

The instruction unites, as far as possible, theory and practice—theory explaining practice and practice illustrating theory. The technical studies are taught mainly by lectures, with careful readings of standard agricultural books and periodicals, and frequent discussions, oral and written, of the principles taught. These are also illustrated by demonstrations and observations in the fields, stables, orchards, gardens, plant-houses, etc.

SPECIAL STUDIES.

AGRICULTURE.

Elements of Agriculture.—Outline of the general principles underlying Agriculture in its theory and practice, introductory to the technical and scientific studies of the course.

Agricultural Engineering and Architecture.—Arrangement of the farm; its improvement by mechanical means, as drainage and irrigation; its divisions, fences, hedges, etc.; its water supply; the construction of roads; arrangement, planning and construction of farm buildings; the construction, selection, care, and use of farm implements and machinery.

Animal Husbandry.—Principles of breeding and management of our domestic animals; description of all important breeds and varieties, giving their history and adaptations.

Rural Economy.—Relation of Agriculture to other industries and to national prosperity; influences which should determine the class of farming to be adopted; comparisons of special and general systems; uniting of manufacturing with farming; culture of the various farm crops—cereals, grasses, etc.; farm accounts.

History of Agriculture.—Progress and present condition in this and in other countries. Influence of climate, civilization, and legislation in advancing or retarding. Agricultural literature and organizations.

Rural Law.—Business law; laws especially affecting agriculture—tenures of real estate; road, fence, drainage laws, etc.

HORTICULTURE.

Elements of Horticulture. — The following topics are discussed: Orchard sites; the age of trees to plant; the season to plant; how to plant; what to plant; the management of

the soil; pruning and care of trees; gathering and preserving fruit; diseases and injuries; the nursery; ornamental trees and shrubs; flower gardens; vegetable gardens, including propagating beds and houses; the vineyard and small fruits, and timber tree plantation. Students have instruction and practice in grafting, budding, propagation by cuttings, etc. Each student has usually grafted from two hundred to one thousand root grafts of apples.

Landscape Gardening.—Lectures are given upon the general principles of the art, the history and the styles, the kinds and uses of trees, shrubs, grasses and flowers, the introduction and management of water, the construction and laying out of drives and walks, fences, buildings, etc. The class draw first from copy, then, after the actual study of some locality with its environments, design and draw full plans for its improvement, indicating positions of all prominent objects, including the kinds and groups of trees and other plants. These plans, with specifications, are to be deposited in the library of the school. Excursions are made when found practicable, for the study of public and private grounds.

The three following studies constitute a year's work designed for those who wish to prepare themselves for special horticultural pursuits, and may he taken as substitutes for agricultural or veterinary studies:

Floriculture. — The study of the kinds, propagation, growth and care of flowering and other ornamental plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatments. Insects and diseases, with the remedies, are thoroughly treated, and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice.

Pomology and Forestry.—Much of the first half of the term is spent in the orchards, nurseries, and forests, making observations and collections, and in laboratory work, determining species, varieties, etc. A large collection of apples, pears, grapes, peaches, etc., is made each year, and the chief characteristics of each pointed out. Practice is had in making drawings and plaster casts. Written descriptions of the fruits are carefully made and compared with those given in the books, and systems of analysis and classification are put

to practical tests. Students see and perform the skilled operations usually practiced in the propagation and growth of trees. Various methods of pruning and training, especially of grapes, are discussed in the class-room, and illustrated upon the grounds. Students study the injurious insects and fungi which cause or accompany diseases of trees and fruits, and the methods of preventing or diminishing their ravages. The native forests of the vicinity and of the country at large are studied as a foundation for the lessons upon the influence and value of timber and other trees, and their artificial culture. For the latter, the forest tree plantation on the University grounds, and the aboretum, afford practical illustrations.

Plant-Houses and Management.—This study includes gardening and landscape architecture, the methods of construction, heating and ventilation, and general management, so as to secure, under the different circumstances, the best plant growth. The class-room work consists of lectures and architectural designing and drawing. Illustration and practice are afforded by the plant-houses of the University.

VETERINARY SCIENCE.

This science is taught during the third year. In the first term the Anatomy and Physiology of the domestic animals are taught by lectures, demonstrations and dissections. Post-mortems of healthy and of diseased animals are made, so that the students may become practically acquainted with the tissues in health and in disease. The second term is devoted to the study of Veterinary Medicines, their action and uses; and to lectures on the principles and practice of Veterinary Science. During the entire year practical instruction is given in clinical work, as cases present themselves, at the Veterinary Infirmary, where animals are treated or operated on, free of charge, for the instruction of the students. Lectures are given on Veterinary Sanitary Science and the Principles and Practice of Veterinary Surgery.

Students desiring to pursue the study of Veterinary Science further than is laid down in the agricultural course, will find ample facilities for so doing.

LABORATORY WORK.

Experiments and special investigations by each student. A thesis is required, embodying the results of original observation and research.

For details as to the study of Botany, Chemistry, Zoölogy, Entomology, Geology, and Meteorology, see statements in *College of Natural Science.*

APPARATUS.

The College has for the illustration of practical agriculture, a Stock Farm of 400 acres, provided with a large stock-barn fitted up with stables, pens, yards, etc.; also an Experimental Farm of 180 acres, furnished with all necessary apparatus to illustrate the problems of breeding and feeding. It has fine specimens of neat cattle, Short-Horns, Herefords, Holsteins and Jerseys, and Berkshire and Poland-China Swine. The Agricultural Experiment Station recently established as a department of the University exhibits field experiments, in the testing of the different varieties and modes of culture of field crops, and in the comparison and treatment of soils. It includes experiments in agriculture and horticulture, under the direction of the Professors of Agriculture and Horticulture, and experiments in feeding animals of different ages and development, upon the various kinds of food. In common with similar departments in the several Agricultural Colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science.

The barn on the Stock Farm has north and west fronts of 80 feet each. Each limb, or L, is 40 feet wide. It is of the kind known as the hill-side barn. The barn on the Experimental Farm is of less size, but is fitted up with great convenience, and is supplied with a large windmill which furnishes power for grinding feed, and for other purposes.

A veterinary hall and stable have been provided, and a clinic is held to illustrate the lectures on veterinary science. The department has Dr. Auzoux's celebrated complete model of the horse in 97 pieces, exhibiting 3,000 details of structure; also *papier mache* models of the foot and the teeth of the horse at different ages.

Surveying and drainage are illustrated by field practice, with instruments and by models. Agricultural Chemistry is pursued in connection with laboratory practice, in the analysis of soils, fertilizers, foods, etc. The College has fine collections of soils, seeds, plants, implements, skeletons of domestic animals, charts, and other apparatus, including a large number of models of agricultural machinery.

Upon the grounds devoted to the use of the College there are:

1. A very large specimen apple orchard, planted in 1869, and originally containing about 1,000 varieties—many varieties of pears, cherries, grapes, and small fruits.

2. A nursery of young trees, in which students have regular work in propagation, etc.

3. A forest tree plantation, embracing the most useful kinds of timber.

4. An aboretum in which all hardy indigenous and exotic trees are planted as fast as they can be secured, and which now contains nearly 100 varieties. The ornamental grounds which surround the University building embrace about twenty acres, and are kept in neat and attractive style. These, with all the adjuncts of trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks of different materials and styles of laying out, give illustration to the class-room work in landscape gardening. A green-house contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in greenhouse management.

The cabinet contains a series of colored plaster-casts of fruits prepared at the University; *modeles clastiques* of fruits and flowers by Auzoux of Paris; collections of seeds of native and exotic plants; of specimens of native and foreign woods; of beneficial and injurious insects, and specimens showing their work; numerous dry and alcoholic specimens and preparations; maps, charts, diagrams, drawings, etc.

The College has a supply of compound microscopes and apparatus, and students have opportunity to learn their use, and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungous parasites which cause disease to cultivated crops.

AGRICULTURAL COURSE.

Required for the degree of B. S., in College of Agriculture.

FIRST YEAR.

1. Elements of Agriculture; Chemistry; Trigonometry; Shop practice (optional).
2. Elements of Horticulture; Chemistry; American Authors, or Free Hand Drawing.
3. Economic Entomology; Chemistry; British Authors.

SECOND YEAR.

1. Chemistry and Laboratory Practice; Botany; German.
2. Agricultural Chemistry (Soils and Plants); Zoölogy or Botany; German.
3. Agricultural Chemistry (Tillage, Fertilizers, Foods); Vegetable Physiology; German.

THIRD YEAR.

1. Agricultural Engineering and Architecture; Animal Anatomy and Physiology; German.
2. Animal Husbandry; Veterinary Science; Veterinary Materia Medica (optional extra); Physics or Geology.
3. Landscape Gardening; Veterinary Science; Physics or Geology.

FOURTH YEAR.

1. Physiography; Mental Science; History of Civilization.
2. Rural Economy; Constitutional History; Logic.
3. History of Agriculture and Rural Law; Political Economy; Laboratory Work.

N. B.—Students in Horticulture will take the special branches in Horticulture described on pages 36 and 37.

FARMERS' SHORT COURSE.

Students who have not the time necessary for the full course, and yet desire better to fit themselves to be successful farmers, may give exclusive attention to the technical Agricultural studies, including Veterinary Science, and complete these in one year.

The studies of the second, or winter term of this course, are arranged so as to be profitably studied by those who can be in attendance only during that term.

Students will be admitted to this course on passing a satisfactory examination in the common school branches, but they will receive greater benefit from it if they have made better preparation, especially if they have a good knowledge of Botany and Chemistry. They should not be less than eighteen years of age. Special fee $5 per term.

They will be admitted to the following classes:

1. Elements of Agriculture; Agricultural Engineering and Architecture; Animal Anatomy and Physiology; Shop Practice.
2. Animal Husbandry; Rural Economy; Veterinary Science.
3. History of Agriculture and Rural Law; Veterinary Science; Economic Entomology or Landscape Gardening.

COLLEGE OF ENGINEERING.

SCHOOLS.

MECHANICAL ENGINEERING; CIVIL ENGINEERING;
MINING ENGINEERING; ARCHITECTURE.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, Ph. D., LL. D., REGENT.

N. CLIFFORD RICKER, M. Arch., *Dean;* Architecture.

SAMUEL W. SHATTUCK, A. M., C. E., Mathematics.

EDWARD SNYDER, A. M., Modern Languages.

JAMES D. CRAWFORD, A. M., History.

PETER ROOS, Industrial Art and Design.

IRA O. BAKER, C. E., Civil Engineering.

WILLIAM McMURTRIE, E. M., Ph. D., Chemistry.

THEODORE B. COMSTOCK, Sc. D., Mining Engineering.

JAMES H. BROWNLEE, M. A., Rhetoric and Oratory.

CHARLES W. ROLFE, M. S., Geology.

ARTHUR T. WOODS, Mechanical Engineering.

ARTHUR N. TALBOT, C. E., Engineering and Mathematics.

EDWIN A. KIMBALL, Iron Work.

GEORGE W. PARKER, Wood Work.

CURTIS B. HOPPIN, U. S. A., Military Science.

ADMISSION.

Applicants should be at least eighteen years of age. None are admitted under fifteen. The requirements for admission embrace the common school branches and the studies

of the preliminary year. The examinations in Mathematics are especially thorough.

Those who make further preparation than that required before entering can make their course more extensive and profitable. The following suggestions are offered to such as wish to make thorough work:

Either French or German are studied during two years: some preparation in Latin will be of great assistance in these languages. The engineer and architect should be adepts in the various departments of drawing, and some previous study of this branch will be of great advantage. Warren's Draughting Instruments may be used as a text book, and the drawings made on smooth paper, eight by ten inches.

STUDIES PURSUED BY ALL ENGINEERING STUDENTS.

The subjects common to all the schools in the College of engineering will be described first; the topics peculiar to each will be noticed under their specific names.

PURE MATHEMATICS, FIRST YEAR.

Trigonometry.—Plain and spherical. Fundamental relations between trigonometrical functions of angles or arcs; construction and use of tables; solution of triangles; projection of spherical triangles; angles as functions of sides and sides as functions of angles; general formulas; applications.

Analytical Geometry.—The point and right line in a plane; conic sections, their equations and properties; the tangent and subtangent; normal and subnormal, pole and polar, supplementary chords, conjugate diameters, etc. Discussion of the general equation of the second degree containing two variables.

Advanced Algebra.—Functions and their notation; series and the theory of limits; imaginary quantities; general theory of equations.

PURE MATHEMATICS, SECOND YEAR.

Differential Calculus.—Rules for the differentiation of functions of a single variable; successive differentiation; development of functions; maxima and minima of functions of a single variable; differentials of an arc, plane area, surface and volume of revolution; elementary discussion of higher plane curves; the spirals, logarithmic curve, trochoid, etc.; algebraic curves.

Integral Calculus.—Integration of elementary forms and rational fractions; rectification of plane curves; quadrature of plane areas and surfaces of revolution; cubature of solids of revolution.

Advanced Analytical Geometry.—Loci in space; in point, right line, plane, and surfaces of the second order.

Advanced Calculus.—Development of the second state of functions of any number of variables; differential equations; maxima and minima of functions of two or more variables; construction and discussion of curves and surfaces; integration of irrational and transcendental differentials and of differential equations of the higher orders and degrees; applications; elements of elliptic integrals.

PHYSICS.

The course of Physics embraces the kinds of work following:

1. Recitations, five exercises a week, in which a text book is used as a guide.

2. Experiments in Physical Laboratory one day each week, in which the student uses the instruments in testing the principles taught.

3. Illustrated experiments once each week, in which the more costly apparatus is used before the whole class, in such experiments as are difficult to perform, and which are more effective when prepared for an audience.

4. Higher physical experiments by advanced classes, consisting either of researches, or of reviews of careful and elaborate experiments previously worked up by others.

The Department of Physics is provided with illustrative apparatus for use in the lecture-room, and with an extensive Physical Laboratory. The collection of instruments embraces acoustic apparatus from R. Koenig, of Paris; apparatus for heat and molecular physics from J. Salleron, of Paris; for light, optics, and electricity from Stoehrer, of Leipsic, and Browning and Newton, of London; pneumatic and electrical apparatus from E. S. Ritchie, of Boston; and a large number of pieces prepared at the mechanical shops of the University. It includes, also, Browning's electric lamp; and from Eliot Brothers, London, resistance coils, galvanometers, ammeters and voltmeters for higher researches in electricity.

A large dynamo in the machine shops is connected with the laboratory. A room on the ground floor is especially devoted to instruction in electrical measurements.

DRAWING.

Projection Drawing.—Use of instruments in applying the elements of descriptive geometry; use of water colors; isometrical drawing; shades and shadows; perspective; drawing of machines, bridges, roofs, etc., finished by line shading, tints and colors.

Free Hand Drawing.—Outline sketches; drawing from casts; sketches of machines, etc.

Lettering.—Plain and ornamental alphabets; titles and title pages; round and stump writing.

Descriptive Geometry.—Problems on the point, right line, and plane; warped surfaces, perspective; shades and shadows; practical problems.

APPLIED MATHEMATICS.

Analytical Mechanics.—Polygon of forces; equations of equilibrium of moments; center of gravity; moment of inertia; acceleration, work, momentum, impact; motion of free particles; central forces; constrained motion.

Strength of Materials.—Elasticity; safe limits; shearing stress; flexure and strength of beams and columns; practical formulas.

Hydraulics.—Amount of and center of pressure upon submerged surfaces; flow of liquids through orifices, weirs, pipes and channels; distribution of water in cities.

THESES.

In all the schools in this College a thesis is required as a condition of graduation. It must be an original composition of suitable length, upon a subject appropriate to the school, and approved by the Professor in charge. It must be illustrated with such photographs, drawings, and sketches as may be needed, and embellished with a title page neatly lettered with India ink or colors. It must be upon regulation paper, and securely bound. It will be prepared during the latter part of the fourth year, and presented at the close of the course, after which it will be deposited in the library of the University.

CONTRIBUTIONS.

Our friends and students are invited to send us specimens of material and manufactures, and drawings, models, or photographs of machinery, bridges and other engineering and architectural works. Finished and detailed working drawings, perhaps otherwise useless, may be of great value for instruction. Illustrated circulars and price lists of manufacturing firms are desired. Contributions will be labeled with donors' names, and placed in the Museum of Industrial Arts for the inspection of students and the illustration of lectures.

SCHOOL OF MECHANICAL ENGINEERING.

OBJECT OF THE SCHOOL.

This school seeks to prepare students for the profession of Mechanical Engineering. It aims to fit them to invent, design, construct, and manage machinery for any branch of manufactures. The state needs men who, to a thorough knowledge of the principles of machinery and of the various motors, add the practical skill necessary to design and construct the machines by which these motors are made to do work.

INSTRUCTION.

The instruction, while severely scientific, is thoroughly practical. It aims at a clear understanding and mastery of all mechanical principles and devices. Practice in the Mechanical Laboratory is counted as one of the studies of the course.

In *principles* instruction is imparted by lectures, illustrated plates and by text books. Examples are given, showing the application of the theories and principles taught. Experiments in the testing of machines and motors are undertaken by the student.

In *practice* elementary forms are produced and projects are executed, in which the student constructs machines, or parts thereof, of his own designing, and from his own working drawings.

In *designing* the student begins with elements, and proceeds with progressive exercises till he is able to design and represent complete machines.

MECHANICAL ART AND DESIGN.

An elementary course of shop practice has been carefully arranged, to familiarize the student with the forms of the parts of machines, and the mode of producing them. He is made familiar with all the ordinary cutting tools for iron or wood; with the form and condition for most effective work; with the machines and appliances by which they are put in action, and the instruments by which desired dimensions of product are obtained. This practice is obtained in the Mechanical Laboratory, and represents five different shops, viz:

1—Pattern Making.
2—Blacksmithing.
3—Foundry Work.
4—Bench Work for Iron.
5—Machine Tool Work for Iron.

In the 1st, the practice consists in planing, turning, chiseling, etc., in producing true surfaces in various forms in wood, and also in combining pieces by glue joint, etc., preliminary to correct pattern making. Patterns are finally made from which are cast pieces in iron, brass, etc., to be worked in the subsequent shops.

In the 2d, the student uses the forge and performs the various elementary operations, such as drawing, upsetting, bending, welding, etc.

In the 3d, the processes of moulding and casting are fully illustrated.

In the 4th, there is first a course of free-hand bench work, the cold chisel and file being the only tools. After the hand and eye are sufficiently trained, fitting is begun, and the square, bevel, rule, compasses, and other auxiliary bench tools are used. Pieces are then fitted together by the file, with surfaces carefully finished.

In the 5th shop, the ordinary machine tools of the machine shop are used. The first practice employs these machines with their cutting tools or bits, in common operations, such as turning cylinders, discs, grooves and fillets; boring, drilling, hand-turning, milling, planing, etc. Following this is a course of practice in fitting and finishing, in which calipers, rules, etc., are introduced, and many of the various fittings employed in machinery are produced.

Previous to the shop work, drawings of the pieces are made by the student, and the exact thing to be done is indicated; thus mistakes are avoided and practice facilitated.

The designing of such machine elements as pulleys, journal boxes, cranks, stuffing boxes, etc., cultivates a knowledge of proportion, and of its proper representation on paper. This course of elementary practice fits the student for the advanced shop practice in designing and construction of complete machines undertaken later in the course.

TECHNICAL STUDIES.

Kinematics and Principles of Mechanism.—Relative motion of points in a system of connected pieces; motion independent of force; velocity ratio; investigation of motion of elementary parts of machines, as friction and non-circular wheels in rolling contact, cams and curves in sliding contact: gear teeth; gearing chains; escapements; link work.

Prime Movers.—The theory and useful effects of turbine water wheels and best form of the parts for high efficiency. Other water wheels and wind wheels. Application of thermodynamics in the study of best engines. Relative economy of different engines.

Mill Work and Machinery.—Trains of mechanism studied with reference to their resistance and efficiency; best forms for transmission of power for short or great distances; forms of the parts for securing desired results in power and velocity; elastic and ultimate strength of parts.

Machine Drawing.—Working drawings of original designs; finishing in water colors, and in line shading; details for shop use, according to the practice of leading manufactures.

PROJECTS AND PRACTICE.

The shop practice of the first year has already been described. The second year practice will have for its object the production of some model or machine. The students, under the immediate direction of the teachers, carefully determine the dimensions and shapes best suited for the parts of some machine, produce them in neat and accurate working drawings, and make tracings for shop use. No student will commence his advanced shop practice without working drawings. The designs are such as require execution in iron, brass, and wood, for the purpose of giving variety of practice. The

student is required to make the patterns and castings, finish the parts, and put them together in accordance with the working drawings and the required standard of workmanship. This acquaints him with the manner in which the mechanical engineer carries his design into execution, and teaches him so to shape, proportion and dispose the parts of a machine as to secure the greatest economy of construction and durability in use. The practice of the third year will include the careful construction of mechanical movements strictly in accordance with the theoretical determination of the form of the parts.

The steam engine, large drill press, one engine lathe, the hand lathes, and the milling machine, now in use, were designed here, and built in the shop by students in the department.

Experiments and Practical Problems.—Experiments in the testing of prime movers and other machines, are undertaken by the students. They take indicator diagrams from the engine of the Mechanical Laboratories, and in factories in the adjoining towns, and determine from them the power developed with different degrees of expansion, and the possible defects of valve movement in distribution of steam.

APPARATUS.

This school is provided with plates and a cabinet of models illustrating mechanical movements and elementary combinations of mechanism. This collection is rapidly increasing by our own manufacture, and by purchase from abroad. It includes many of Riggs' models, and others from the celebrated manufactory of J. Schroeder, of Darmstadt, Germany. About two hundred valuable models from the United States Patent Office are also included in the cabinet.

The State has provided a large Mechanical Laboratory and Workshop, furnished with complete sets of tools, benches, vices, and forges, with flasks for moulding in sand, and cupola for melting iron.

STUDIES.

The studies are given by the year and term in the tabular view of the course. The order there indicated should be closely followed, that the student may avoid interference of his hours of recitation.

MECHANICAL ENGINEERING COURSE.

Required for the Degree of B. S., in School of Mechanical Engineering.

FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; German or French.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; German or French.
3. Advanced Algebra; Free Hand Drawing; Shop Practice; German or French.

SECOND YEAR.

1. Calculus; Designing and Construction of Machines; German or French.
2. Advanced Analytical Geometry; Designing and Construction of Machines; German or French.
3. Advanced Calculus; Engineering Materials and Designing of Machines; German or French.

THIRD YEAR.

1. Mechanism; Analytical Mechanics; Chemistry.
2. Physics; Resistance of Materials; Chemistry.
3. Physics; Advanced Descriptive Geometry; Astronomy.

FOURTH YEAR.

1. Prime Movers; Construction Drawing; Mental Science.
2. Prime Movers; Construction Drawing; Constitutional History.
3. Mill Work; Designing and Laboratory Practice; Political Economy.

In this course the student will take two years of either French or German, but not one year of each.

SCHOOL OF CIVIL ENGINEERING.

OBJECTS OF THE SCHOOL.

The school is designed to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

INSTRUCTION.

The student should lay a broad foundation in general culture, which will enable him to pursue his professional studies with greater ease and advantage. With this view the subjects peculiar to civil engineering are not introduced until the second year.

The instruction is given by lectures, text books and reading, to which are added numerous problems and practical

exercises, as serving best to explain subjects completely and fix them in mind. Models and instruments are continually used, both in lectures and by the students themselves.

COURSE OF STUDIES.

The complete course occupies four years. The studies of the first three years will prepare students for undertaking many engineering operations, such as making land and topographical surveys, building railroads, canals, embankments, etc. The fourth year is intended to fit them for higher engineering operations, such as making geodetic surveys, building arches, trussed bridges, and supporting frames of all kinds.

The order of studies as given by the year and term in the tabular view of the course should be closely followed so that the student may avoid interference of hours of recitation, and because the studies are there given in the order which best meets the preparation of the student.

TECHNICAL STUDIES.

Astronomy.—Descriptive Astronomy is given with a text book. The equatorial telescope is in constant use during favorable weather. Practical astronomy is given by lectures and the use of the alt-azimuth instrument, the astronomical transit, the sextant, and the engineer's transit, adapted to astronomical calculations. The work includes the use and adjustment of instruments, and the determination of time, latitude, longitude and azimuth.

Bridges.—Calculation of trusses in the various forms of bridging, by algebraic and graphical methods, consideration being given to weights of bridge and train and force of wind; designing trusses and proportioning sections; details.

Geodesy.—Spirit, barometrical and trigonometrical leveling; base lines, stations, and triangulation; parallels and meridians; projection of maps.

Land Surveying.—Areas and distances, by chain, compass, and plane table; omissions and corrections; metrical system; methods of U. S. public lands surveys; magnetic variations; determination of true meridian.

Railroad Surveying.—Economic location; curves and grades and their inter-adjustment; earth work; curvature and elevation of rail; easement curves; turnouts; crossings; maintenance of way.

Stone Work.—Stone, brick, lime, mortar, cement; foundations; retaining walls; arches, etc.

Topography.—Use of stadia, plane table and level; contours; soundings. Sketching, mapping, conventional signs; city and country maps.

Theory of Engineering Instruments.—Examination of workmanship and design; testing instrument maker's adjustments; engineer's adjustments; determination of areas with transit; inaccessable and air line distances; profiles; heights and distances with stadia; measurement of angles with sextant, etc.

PRACTICE.

In the fall term of the second year the class will solve numerous problems in distances, areas, etc., using the chain, compass and plane table. During the winter term the student will have practice with all the engineering instruments and solve problems with the transit, stadia, level and sextant. In the spring term the class makes a careful topographical survey of a locality, using the stadia and plane table as in the United States surveys.

In the fall term of the third year the class will execute a project in railroad engineering, which will consist of preliminary surveys, location, staking out, drawings, computations of earth work, etc. The preliminary survey will consist in an examination of the locality, and in running tangent lines, with leveling and topographical sketching. The location will consist in running the line over the route decided upon, with all the necessary measurements and calculations for establishing the grade, setting slope stakes, etc. The drawings will include alignment, profile, plans, etc.

A project in geodèsy or higher engineering will be executed during the fall term of the senior year. During this term the students have exercises in practical astronomy.

APPARATUS.

For Field Practice.—The school is well provided with the instruments necessary for the different branches of engineering field practice, which include chains, tape, compass, plane table, stadias, transits, levels barometer for barometrical leveling, base rods and comparing apparatus, sextants, engineer's transits arranged for astronomical observation,

An astronomical observatory is provided with an equatoral telescope, an astronomical transit, with attachment for zenith telescope work, a chronometer, and a set of meteorological instruments.

A portable altitude and azimuth instrument of the latest and best form, from the celebrated makers, Troughton & Simms, of London, is used for instruction in Geodesy and Practical Astronomy. It is read by micrometer microscopes to single seconds, both of altitude and of azimuth.

To facilitate practice in trigonometrical and land surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them.

For the Lecture Room.—The school has numerous models for illustrating its specialties, including descriptive geometry and astronomy; models of bridges, roofs, joints and connections; a large collection of drawings, photographs, and photo-lithographs of bridges, roofs and engineering structures; it has access to the Museum of Industrial Arts, which contains models illustrating wood, stone, and metal construction, and to a complete set of lithographs of the lectures and drawings used in the government Polytechnic Schools of France.

The Library is well supplied with the latest and best periodicals and books upon engineering subjects.

CIVIL ENGINEERING COURSE.

Required for the Degree of B. S., in School of Civil Engineering.

FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; French or German.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; French or German.
3. Advanced Algebra; Free-Hand Drawing; Shop Practice; French or German.

SECOND YEAR.

1. Calculus; Land Surveying; French or German.
2. Advanced Analytical Geometry; Surveying and Theory of Instruments; French or German.
3. Advanced Calculus; Topographical Surveying and Drawing; French or German.

THIRD YEAR.

1. Analytical Mechanics; Chemistry; Railroad Engineering.
2. Resistance of Materials; Chemistry; Physics.
3. Advanced Descriptive Geometry; Astronomy; Physics.

FOURTH YEAR.

1. Mine Attack; Geodesy and Practical Astronomy; Mental Science.
2. Bridges; Stone Work; Constitutional History.
3. Geology; Bridge Construction; Political Economy.

In this course the student will take two years of German or French, but not one year of each.

GEOGRAPHICAL POSITION OF THE UNIVERSITY.

The Observatory has the following position:
Latitude, 40° 6′ 29″.66.
Longitude, west of Washington, 11° 10′ 37″.5. or 44m. 42.5s.
Elevation above sea level, 720 feet.

SCHOOL OF MINING ENGINEERING.

OBJECT OF THE SCHOOL.

The school has been established to meet the growing demand of a very important industry for thoroughly trained engineers, fitted to solve the numerous perplexing problems which are constantly arising in all mining work. The subjects of the discovery, opening, economical working and proper ventilation of mines, the prevention of accidents, transportaton above and below ground, treatment of products, with many others which fall within the scope of the mining engineer, can be mastered only by a careful study of facts and principles. This is the proper foundation for the practical work of the profession, and it is the aim of this school to present this in the most complete and thorough manner.

INSTRUCTION.

It is important that a broad basis be laid by way of general preparation for the more technical studies here included. Whatever of general culture the student may obtain before entering the University, will not come amiss, and, although the requirement is not made, it is advised that all who can do so should acquire a reading knowledge of French or German before beginning this course.

The course comprises the greater part of the pure and applied mathematics of the course in mechanical and civil engineering. Much time is devoted to chemistry and geology, with the addition of metallurgy and other technical studies peculiar to mining engineering.

Students who are graduated from this school are not supposed to be familiar with all the details of mine management from actual experience, but they will have obtained such a knowledge of the principles underlying all successful practice, and such a familiarity wlth the science of mining in all its branches, that the art may be acquired with the minimum of practice.

Lectures are given when desirable, but these are to be regarded as supplementary to other modes of instruction which are made to conform as closely as possible to the routine of the engineer in practice. In every detail the student is made to feel that he is dealing with the actual problems which he will meet in his professional work.

Plans, estimates, drawings, reports and calculations, based upon data obtained in the student's own experience, are constantly required, and no pains is spared to familiarize each member of the class with the duties and responsibilities of every grade, from miner to manager.

COURSE OF STUDIES.

In the first two years the work is similar to that required in the course in civil engineering, but more time is given to chemistry. In the third year geology and mining engineering, with assaying and metallurgy, take the places of special technical studies in the other engineering courses. In the fourth year, with the exception of two terms of prime movers taken with the students in mechanical engineering and some studies of general character, the work is strictly technical.

TECHNICAL STUDIES.

Mine Surveying and Reconnoitering.—History, uses and adjustments of instruments; solar compass and various solar attachments; practical problems involving the running of surface lines and lines under ground; connecting of surface and underground surveys; practice of U. S. deputy surveyors. Details of mine surveys, setting of bench works; lines

through shafts, drifts, stopes, etc.; keeping of records, plans, etc. Surveys required to determine best locations for test borings, shafts, adits, etc.; methods of reconnoitering.

Mining Engineering.—1. Attack.—Tools, implements, machinery and explosives, with principles governing their use. Methods of boring, sinking and driving through hard, soft, wet, dry, loose, or compact material.

2. *Timbering.*—Objects, methods, etc.; framing, fitting, bracing.

3. *Transportation.*—Underground haulage, hoisting, use of chutes; apparatus and appliances, cars, tracks, switches, cables, cages, motive power, connections; haulage in inclines, "man-engines," etc.

4. *Drainage.*—Pumps, pumping, sumps, ditches; drainage of working shafts and inclines.

5. *Ventilation.*—Means and appliances. Importance of subject; laws of various states and countries. Discussion of fundamental principles and practical applications, with results.

6. *Buildings and Machinery.*—Hoisting apparatus, air compressors, power drills, etc.

7. *Exploration.*—To determine general character and extent of deposits in advance of development; methods and aims.

8. *Development.*—Blocking out of deposits to prove values of partly explored ground, and to prepare for further exploration.

Exploitation.—Laying out work; trimming of coal, ore, etc.; stoping, overhand and underhand; winzes and intermediate levels; economical handling of product. Methods to be employed under various conditions.

Dislocations.—Faults, upthrows, downthrows, feeders, leaders, rolls, swells, etc. Means of overcoming difficulties.

Dressing of Products.—Coal screening and washing; sampling and grading ore; assorting, crushing, spalling, cobbing; concentrating.

Mining Machinery.—Elements of construction, designing of plant, combination of parts; setting, arranging, adjusting. Preservation and operation, general economy.

Organization.—Economy of management. Secondary superintendence; division of labor and adjustment of responsibility. Prevention of accidents.

Administration.—Review of principles. System of reports from sub-officers, and tabulation of records. Accounts, forms, analyses, pay-rolls, cost sheets, etc. Letting and measuring contracts. Miscellaneous details.

Engineering Geology.—Applications of geology to engineering and mining. Nature and distribution of deposits of economic value, as coal, water, metallic ores, etc.; advanced structural geology and lithology; discussion of principles underlying successful working of mines, placing of foundations, setting of machinery and erection of structures in various situations. Relation of geological structure to drainage, economy of working, selection of points of attack, methods of exploration, etc.

APPARATUS.

The department has a valuable collection of models of mining and metallurgical machinery, and new material will be added as fast as the development of the school will require, and the funds furnished will permit.

The extensive apparatus and collections in other departments are available, and these comprise a large amount of material which is useful for this purpose.

COURSE IN MINING ENGINEERING.

Required for the Degree of B. S., in School of Mining Engineering.

FRESHMAN YEAR.

1. Trigonometry; Projection Drawing; Chemistry; French or German.
2. Analytical Geometry; Descriptive Geometry and Lettering; Chemistry; French or German.
3. Advanced Algebra; Free-Hand Drawing; Chemistry; French or German.

SOPHOMORE YEAR.

1. Land Surveying; Calculus; Chemistry.
2. Theory of Instruments; Advanced Analytical Geometry; Physics.
3. Topographical Surveying; Advanced Calculus; Physics.

JUNIOR YEAR.

1. Mine Attack; Analytical Mechanics; Mineralogy.
2. Geology; Resistance of Materials; Assaying.
3. Geology; Mining Surveying; Metallurgy.

SENIOR YEAR.

1. Mining Engineering; Prime Movers; Mental Science.
2. Engineering Geology; Prime Movers; Constitutional History.
3. Mining Engineering; Mine Administration; Political Economy.

SCHOOL OF ARCHITECTURE.

OBJECT OF THE SCHOOL.

The school prepares students for the profession of Architecture. For this a thorough knowledge of scientific principles applied to building, ability and correct taste in design, and a technical knowledge of the various building trades, with skill in the use of tools, are necessary, and are prominent objects of the course of instruction.

The course embraces the knowledge of the theory and principles of construction and of the ordinary routine work of office practice, so far as these can be taught in a technical school. The technical instruction is given chiefly by lectures, with reference to text books, and is illustrated by sketches, engravings, photographs and models; practical applications are immediately made by students.

Drawing is practiced throughout the course, and, as far as possible, original work is executed. Drawing from casts and modeling in clay give facility in sketching details and correct knowledge of form.

In shop practice, joints in carpentry and joinery, cabinet making, turning, metal and stone work, are executed; also models at reduced scale of roof and bridge trusses, ceilings, domes and stairs.

TECHNICAL STUDIES.

Elements of Drawing.—Lectures; designs, for specified problems; outline sketches and finished drawings from casts in pencil, crayon and charcoal.

Wood Construction.—Frames, roofs, ceilings, domes, heavy frames for mills, etc., roof trusses, stairs, doors, windows, external and internal finish.

Stone Construction.—Materials, mortars and cements, walls, foundations, stone-cutting, tools and modes of using.

Brick Construction.—Materials, bonds, walls, arches, vaults and domes, centerings, etc.

Iron Construction.—Uses and strength of cast and wrought iron and steel; usual forms and formulas for columns, lintels, girders and beams.

Tinner's Work, Slating and Plastering.

Sanitary Construction.—Scientific principles and practi-

cal methods employed in plumbing, water supply, and drainage of buildings.

Architectural Drawing.—Finishing in line, ink, sepia, and color; working out from sketches full sets of drawings for buildings; practical perspective; shades and shadows.

Architectural Designing.—Original sketches for specific projects; one full set of drawings for buildings for specified private or public purpose.

History of Architecture.—Daily lectures and recitations on principal styles, their characteristics, construction and decoration, making especially prominent those ideas applicable in American architecture; tracing of details; designs for special problems.

Esthetics of Architecture.—Esthetics applied to architecture and allied arts, so far as yet made practical; laying out of grounds, arrangement of plans, grouping of masses; decoration, internal and external; treatment of floors, walls, ceilings; art objects, furniture, carpets, etc. About twenty-five original designs for special objects.

Estimates.—Methods of measurement; cost of labor and materials; estimates for specified works.

Agreements and Specifications.—Preparation of sets.

Heating and Ventilation.—Usual methods, by grates, stoves, furnaces, hot water or steam apparatus; fuels, their properties, heating value and products. Problems and applications to specified buildings.

Graphical Statics.—Elements; equilibrium polygon and its applications; roofs, loads and wind pressures; type forms of trusses; determination of strains and dimensions of parts; details of joints; construction and use of graphical tables.

SPECIAL EXERCISES.

Specimen plates will be required of each student at the close of each term in drawing, to form a part of his record. All such plates must be on paper of regulation size, except when otherwise directed.

SHOP PRACTICE.

To give practical knowledge of various kinds of work, three terms are occupied in a course of instruction, which all architectural students are required to pursue unless they have already had equivalent practice.

First Term.—Carpentry and Joinery. Planing flat, square and octagonal prisms and cylinders; framing with single, double and oblique tenons; splices, straight and scarfed; miter, lap and gained joints; through and lap dovetails; mouldings, miters and panels.

Second Term.—Turning and cabinet making; cylinders, balusters capitals and bases of columns, vases, rosettes, etc., fret-sawing, plain and ornamental veneering; inlaying, carving and polishing.

Third Term.—Metal work, pattern making, moulding and casting, filing and finishing, drilling, screws, hand and machine turning.

Stone work designs executed in plaster of Paris; production of plane, rule, warped and spherical surfaces; voussoirs of arches, vaults and domes; decorative carving.

APPARATUS.

A collection of casts donated by the Spanish government, and another of casts of various architectural details from Lehr, of Berlin, belong to the school of Architecture and Designing; models of ceilings, roof trusses, stairs, joints, etc.; Schroeder's models of joints in stone cutting, etc.

The school possesses a large and growing collection of engravings and photographs illustrative of the history of architecture and its practice in all ages.

The casts, photographs, etc., of the Art Gallery. In the library, many of the best English, German, French and American architectural works and periodicals.

A large carpenter and cabinet shop, containing full sets of tools, for shop practice; foot and power lathes; cross and splitting saws; planer, moulder, tenoning machine, lathe, whittler, fret saw, etc.

ARCHITECTURAL COURSE.

Required for the Degree of B. S., in School of Architecture.

FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; French or German.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; French or German.
3. Advanced Algebra; Graphical Statics; Shop Practice; French or German.

SECOND YEAR.

1. Elements of Wood Construction; Calculus; Free Hand Drawing and Modeling.
2. Elements of Stone, Brick and Metal Construction; Advanced Analytical Geometry; Architectural Drawing and Designing.
3. Elements of Sanitary Construction; Advanced Calculus; Water Color Sketching.

THIRD YEAR.

1. Architectural Drawing; Analytical Mechanics; Chemistry.
2. History of Architecture; Resistance of Materials; Physics.
3. History of Architecture; Advanced Descriptive Geometry; Physics.

FOURTH YEAR.

1. Esthetics of Architecture; Architectural Perspective; History of Civilization.
2. Architectural Designing; Heating and Ventilation; Constitutional History.
3. Architectural Designing; Estimates, Agreements and Specifications; Political Economy.

BUILDER'S COURSE.

The Trustees allow persons desiring to fit themselves for master builders to take a course of a single year, pursuing such technical studies of the course in architecture as they may be prepared to enter upon with profit, and as will be most advantageous to them.

Candidates for the Builder's Course must pass the examinations in the common branches, but need not pass in the studies of the preliminary year unless they shall desire to pursue other studies than those marked in the following schedule. Special fee, $5 per term.

BUILDER'S COURSE OF STUDY.

1. Wood Construction; Projection Drawing; Shop Practice (Carpentry and Joinery),
2. Stone, Brick and Metal Construction; Architectural Drawing; Shop Practice (Stair Building).
3. Graphical Statics; Architectural Designing; Shop Practice (Cabinet Making).

COLLEGE OF NATURAL SCIENCE.

SCHOOLS.

CHEMISTRY. NATURAL HISTORY.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, Ph. D., LL. D., REGENT.

WILLIAM McMURTRIE, E. M., Ph. D., *Dean*; Chemistry.

THOMAS J. BURRILL, M. A., Ph. D., Botany and Horticulture.

SAMUEL W. SHATTUCK, M. A., C. E., Mathematics.

EDWARD SNYDER, M. A., Modern Languages.

JAMES D. CRAWFORD, M. A., History.

PETER ROOS, Industrial Art.

STEPHEN A. FORBES, Ph. D., Entomology and Zoölogy.

JAMES H. BROWNLEE, M. A., Rhetoric and Oratory.

CHARLES W. ROLFE, M. S., Geology.

CURTIS B. HOPPIN, Lt. U. S. A., Military Science.

W. H. GARMAN, Zoölogy.

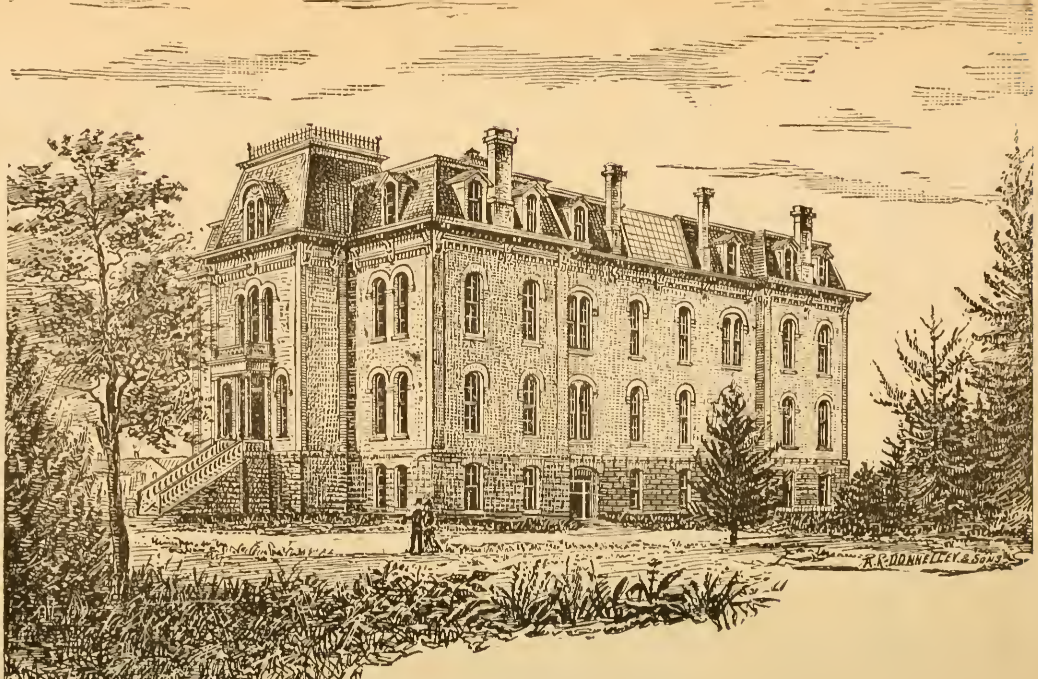
ARTHUR W. PALMER, Sc. D., Asst. in Chemistry.

BEDROS TATARIAN, B. S., Asst. in Chemistry.

CHARLES E. EGGERT, Ph. B., Instructor in French.

ADMISSION.

Candidates for the College of Natural Science must be at least fifteen years of age, and must pass satisfactory examinations in the common school branches, and in the studies of the preliminary year.



CHEMICAL LABORATORY.

Their preparation should be especially good in the scientific studies of the preliminary year. Some practice in the drawing of natural objects will greatly facilitate the student's progress. A knowledge of the Latin language is a good preparation for the mastery of the scientific terms which must be learned in the course.

SCHOOL OF CHEMISTRY.

This School aims to impart such knowledge of Chemistry as will enable the student to apply the principles of the science to the related arts, and as will fit him for original research, or for the business of the druggist, pharmaceutist, and practical chemist.

INSTRUCTION.

The first term of the first year is occupied by text-book instruction, lectures, and experiments in the laboratory, illustrating the elementary principles of chemistry, chemical physics, and inorganic chemistry. The second term is devoted to laboratory practice in qualitative analysis. In the third term recitations upon organic chemistry and illustrative synthetic experiments alternate with laboratory practice in qualitative analysis. During the next three years each student is expected to work two hours daily in the laboratory five days in the week. In order to graduate, each is required, at the end of his course, to make an original investigation, and present a Thesis.

Students who pursue chemistry as a part of other courses, work at least two consecutive hours daily during such time as their specialties may require.

Deposits.—At the beginning of each term of laboratory practice, each student will deposit twelve dollars with the business agent of the University. At the end of the term, the balance left, after deducting payment for gas, chemicals, and apparatus used, will be refunded.

Five courses of laboratory work have been arranged, as follows:

CHEMICAL COURSE.

FIRST YEAR.

First Term.—General, theoretical, and applied chemistry. Lectures text-book, and illustrative experiments in the laboratory.

Second Term.—Qualitative analysis. Tests and separation of the

bases and acids. Systematic examination of 40 simple and compound substances.

Third Term.—Organic chemistry. Text-book and recitations, with illustrative synthetic experiments in the laboratory.

SECOND YEAR.

First Term.—Quantitative analysis. Class room and laboratory exercise. Gravimetric analysis of salts of known composition; barium chloride, sodium phosphate, Rochelle salt, calcite, ammonium ferric sulphate. Volumetric analysis; acidimetry and alkalimetry, etc.

Second Term.—Quantitative analysis of compounds of unknown composition. Limestone, clay, feldspar, iron ore. Lectures in agricultural chemistry begun.

Third Term.—Agricultural chemistry completed. Advanced organic chemistry begun. Ultimate organic analysis. Determination of carbon, hydrogen, nitrogen, chlorine, phosphorus, and sulphur in carbon compounds.

THIRD YEAR.

First Term.—Advanced organic chemistry continued. Principles and practice of organic synthesis. Preparation of carbon compounds, and study of their composition and properties.

Second Term.—Assaying. Dry assays of gold, silver, lead, and tin ores. Valuation of bullion. Blowpipe assays of silver ores. Volumetric assays of ores of silver, lead, copper, zinc, etc. Electrolytic separation of the metals.

Third Term.—Examination of agricultural products. Analysis of soil. Valuation of commercial fertilizers—phosphates, nitrogenous matters, and potash salts. Analysis of fodders, milk, and butter. Examination of alcoholic liquors. Metallurgy.

FOURTH YEAR.

First Term.—Gas analysis. Calibration of eudiometers. Analysis of air from lungs, atmospheric air, artificial gaseous mixtures, crude coal gas, furnace gases, etc. Analysis of waters, mineral and potable. Chemical technology.

Second Term.—Toxicology. Micro-chemistry of poisons. Tests for mineral and vegetable poisons. Separation from organic mixtures.

Third Term.—Original research. Thesis.

PHARMACEUTICAL COURSE.

FIRST YEAR.

Same as in chemical course throughout the year.

SECOND YEAR.

First Term.—Same as in chemical course.

Second Term.—Quantitative analysis of commercial drugs, bismuth subnitrate, tartar emetic, sodium bicarbonate, potassium iodide, sodium bromide, cream of tartar, ammonium carbonate, potassium nitrate. Volumetric determinations.

Third Term.—Same as in chemical course, substituting materia medica for agricultural chemistry.

THIRD YEAR.

First Term.—Same as in chemical course.

Second Term.—Isolation and quantitative estimation of active proximate principles of vegetable drugs—oils, resins, gums, alkaloids, glucoses, etc.

Third Term.—Practice of pharmacy. Reading and compounding prescriptions. Preparation and valuation of tinctures, extracts, syrups, etc. Examination of commercial organic drugs.

FOURTH YEAR.

First Term.—Analysis of urine, normal and pathological. Examination of waters, mineral and potable. Alcoholic liquors, proprietary articles, etc.

Second Term.—Toxicology. Micro-chemistry of poisons. Separation of poisons from organic mixtures.

Third Term.—Original research. Thesis.

COURSE IN AGRICULTURAL CHEMISTRY.

A. Arranged for students who desire to make a specialty of chemistry in its application to agriculture and allied branches.

FIRST YEAR.

Same as in chemical course.

SECOND YEAR.

First Term.—Same as in chemical course.

Second Term.—Lectures and class work in agricultural chemistry. Analysis of feldspar, soil, ash of plants, drain waters.

Third Term.—Agricultural chemistry. Analysis and valuation of commercial fertilizers, manures, and material used for manures, apatite, phosphates, guanos, nitrates, ammonia salts, animal matters, and potash salts.

THIRD YEAR.

First Term.—Proximate analysis of farm products and cattle foods; grains, roots, fodders, commercial foods, etc.

Second Term.—Analysis of milk, butter, and cheese. Determination of sugars by polariscope and by titration. Examination of alcoholic liquors.

Third Term.—Original research.

B. Arranged especially for regular students in the school of agriculture.

FIRST YEAR.

Same as in chemical course.

SECOND YEAR.

First Term.—Same as in chemical course.

Second Term.—Agricultural chemistry. Lectures and class work. Analysis of feldspar, soil, plant ash, fertilizers, and manures, and the materials used in their productions; phosphates, nitrogenous matters, and potash salts.

Third Term.—Agricultural chemistry. Lectures and class work. Analysis of farm products—grains, roots, fodders, commercial foods, milk, butter, and cheese.

METALLURGICAL COURSE.

FIRST YEAR.

First Term.—Same as in chemical course.
Second Term.—Same as in chemical course.
Third Term.—Same as first term, second year, chemical course.

SECOND YEAR.

First Term.—Analysis of ores, iron, manganese, zinc, copper, lead, nickel, etc.

Second Term.—Assaying. Same as in chemical course. (Students who pursue this term's work must have had one term of mineralogy.)

Third Term.—Analysis of refractory materials, fluxes, and slags.

THIRD YEAR.

First Term.—Gas analysis. Same as in chemical course. Study of furnace gases.

Second Term.—Analysis of fuels—wood, anthracite and bituminous coals, coke; determination of heating power.

Third Term.—Analysis of cast iron, wrought iron, and steel. Determinations of sulphur, silicon, manganese, phosphorus, and the forms of carbon.

The above course has been arranged for students desiring to make a specialty of chemistry in its applications to metallurgy. For students in the school of mining engineering the work of the first year described, together with the following, is presented:

SOPHOMORE YEAR.

First Term.—Analysis of ores—iron, zinc, copper. Analysis of crude metals—iron, determination of sulphur, silicon, manganese, phosphorus, and the forms of carbon.

JUNIOR YEAR.

Second Term.—Assaying, same as in chemical course, third term. Metallurgy, with laboratory practice. Analysis of fluxes, slags, fuels, etc.

APPARATUS.

The facilities offered for obtaining a practical knowledge of Chemistry are believed to be unsurpassed by those of any other institution in the West. A large laboratory building, 75x120 feet, and four stories in height, has been erected at an expense, including furniture, of $40,000.

The basement contains a furnace room for assaying and metallurgical operation; a mill room for storing and crushing ores; and a large room for the manufacture of chemicals and pharmaceutical preparations.

The first story contains a lecture-room capable of seating 200 persons, and a qualitative laboratory, which, when

completed, will accommodate 152 students; one hundred and four desks are now fitted, each having an evaporating hood, gas, and water. There are a spectroscope table, a blow pipe table for general use, and a store room stocked with apparatus and chemicals.

The second story, designed for the use of advanced students, has the following apartments: A lecture room with mineralogical cabinet, and furnace models for illustrating lectures on metallurgy; laboratory for students in agricultural chemistry; large laboratory for quantitative analysis, now containing sixty-four desks; a balance room, containing chemical balances of the manufacture of Bunge (short beam), Becker & Son, Troemner; a pharmacy, furnished like a drug store with shelves, drawers, prescription desk, balance, graduates, etc., and containing a full set of drugs and pharmaceutical preparations made in the laboratory by students in pharmacy; private laboratory for instructors; a gas analysis room, entirely cut off from the system of heating and ventilating, to avoid undue fluctuations of temperature, furnished with a table specially constructed, and containing a full set of Bunsen's gasometric apparatus, an inductive coil, battery, mercury, etc; and a store room with apparatus for all kinds of work in quantitative analysis.

The apparatus for general use includes a large platinum retort for the preparation of hydrofluoric acid; a Geissler's mercurial air pump; Hoffman's apparatus for illustrating the composition of compound gases; a Soliel-Scheibler's saccharimeter; an excellent set of areometers; a Hauy's goniometer; a camera with Ross' lenses; a Ruhmkorff's coil; galvanic batteries; a galvanometer; a spectroscope; microscopes; gas combustion furnaces for organic analysis, etc.

On the mansard floor ample provision has been been made for the study of photography.

COURSE IN CHEMISTRY.

Required for Degree of B. S. in School of Chemistry.

FIRST YEAR.

1. Chemistry, General and Applied; Trigonometry; Free Hand Drawing; French.
2. Chemistry and Laboratory Practice; Conic Sections; Free Hand Drawing; French.
3. Organic Chemistry and Laboratory Practice; Free Hand Drawing; Calculus; French.

SECOND YEAR.

1. Chemistry and Laboratory Practice; Physiology or Botany; German.
2. Agricultural Chemistry and Laboratory Practice; Microscopy; German.
3. Agricultural Chemistry and Laboratory Practice; Vegetable Physiology; German.

THIRD YEAR.

1. Laboratory Practice; Mineralogy; German.
2. Laboratory Practice; Physics; German.
3. Laboratory Practice; Physics; German.

FOURTH YEAR.

1. Laboratory Practice; Mental Science; Physiography.
2. Laboratory Practice; Constitutional History; Logic.
3. Laboratory Practice; Political Economy; Geology.

Students who are candidates for the degree of B. S. in the School of Chemistry must perform the laboratory work as laid down in some one of the prescribed chemical courses.

SCHOOL OF NATURAL HISTORY.

The School of Natural History is especially intended to provide a general preparation for the professions and business pursuits requiring more of an acquaintance with the methods and facts of science than with those of literature. More specifically, it is designed:

To afford a thorough liberal education with a basis in the sciences and the modern languages.

To prepare for the teaching of the natural history subjects either in the higher schools or as a professional specialty.

To lay a liberal foundation in biological work and study for a course in medicine.

To prepare for the pursuit of specialties in zoölogy, botany, general biology and geology, as a scientific career.

The natural history course of four years leads to the degree of Bachelor of Science. It is distinguished by unusually full instruction in the biological subjects and in the other modern sciences, combined with a thorough course in French and German. It offers two hours a day for a year in botany, and the same each in zoölogy and in general or special biology; a term each of entomology, of human anatomy and physiology; of microscopy, and of mineralogy; two terms each of geology and of physics; a year of chem-

istry; a term each of physiography and of astronomy; a year each of free-hand drawing and of French; five terms each of German and of history; one term each of conic sections, trigonometry, political economy, mental science, and logic; and the equivalent of twenty-nine weeks' work, for one hour a day, in practical English composition and oratory.

In zoölogy, botany, general biology, entomology, geology, microscopy, chemistry, and mineralogy, a thorough course of laboratory work and practice by the students, done under the guidance and criticism of an instructor, is supplemented and developed by lecture and the study of text.

The biological work of the senior year is rendered so far elective in character that it may be made to lead towards the study of medicine, towards natural history teaching, or towards the pursuit of a special scientific career.

Special and elective study is permitted and provided for, but does not lead to a degree.

Graduates in literary courses who wish also the advantages of a scientific course, may pursue elective work or may usually take in two years the degree of Bachelor of Science by carrying the scientific studies of the course alone.

SPECIAL STUDIES.

Botany.—Candidates for admission are examined upon Gray's Lessons in Botany, or an equivalent, and are expected to be able to analyze readily common wild flowers. Beginning with the fall term of the sophomore year, systematic and structural botany is continued by recitations, illustrated lectures, and laboratory work upon fresh, dried, and alcoholic specimens. Students, throughout the course, are required to observe for themselves, and to make notes and drawings of their investigations. A series of these drawings, upon a uniform scale, together with the accompanying descriptions, is deposited in the laboratory. Each student provides himself with suitable pencils, drawing pens, paper, needles in handles, glass slides for mounting objects, and razor for making thin sections.

The first half of the fall term is devoted to the study of the natural orders of flowering plants, their geographical distribution, importance, etc., together with a history of a few special plants and their products. During this time, students

analyze in the laboratory flowering plants of the more difficult orders, Compositæ, Gramineæ, etc., especially such as are best obtained in autumn. During the last half of the term the general morphology of plants, including vegetable anatomy and histology, is studied, practical laboratory work with the microscope being the basis of the instruction. Tests are made from time to time by the use of disguised vegetable substances.

The special morphology of the great divisions of the vegetable kingdom, their chief characteristics, their classifications, and the identification of species of flowerless plants, constitute the work of the second term. Special attention is given to injurious fungi, from specimens in the herbarium, or grown in the laboratory. Aquaria furnish numerous kinds of fresh water algæ, and the green-houses supply specimens in nearly all the groups studied.

Vegetable Physiology is studied in the third term. The instruction is given by lectures or text-book, and by experimental practice. The work includes: The food of plants and its absorption and assimilation; fluids, their kinds, uses, causes of movement, transpiration, respiration, etc.; processes, peculiarities, and results of growth; relations and effects of temperature, light, gravitation, etc.; self and cross fertilization, relation of plants and insects; movements; "sleep of plants," tendrils, climbing vines, etc.; origin and development.

Throughout the course the attempt is made to introduce the students to the literature of the various subjects and to acquaint them with the authorities for the facts stated.

Microscopy.—Students have in this study further practice in the use of the compound microscope, the management of light for particular purposes, the testing of lenses, measurement of magnifying powers and angles of aperture, drawing and photographing objects, the preparation and mounting of material, etc. The application is mainly, but not exclusively, devoted to vegetable tissues and products.

The special aim is to afford the opportunity of gaining a skillful and rational use of the instrument, and an acquaintance with the best methods and processes of preparing and mounting objects. Students provide themselves with slides and covers, needles, forceps, brushes, and razors. Micro-

scopes, section cutters, turn tables, etc., are furnished by the University.

Anatomy and Physiology.—The students admitted to this class have already passed an entrance examination in the elementary principles of anatomy and physiology. They have also had a year's training in zoölogy, which makes a free use of the facts of comparative anatomy possible, and aids greatly in the work of the course.

The main objects of the course are, to make the student familiar with the position, structure, and healthy action of those organs most liable to become diseased; to make plain the part which the nervous system plays in both the healthy and morbid action of the various organs, and in the problems of nutrition and energy.

The subject is taught during the fall term of the junior year. The plan embraces lectures, recitations from the text-book, frequent, almost daily, readings from standard authors, and demonstrations from fresh dissections, alcoholic specimens, microscopical preparations, skeletons, and the manikin.

The library of the University is kept supplied with the standard works and periodicals on anatomy, histology, physiology, and kindred subjects.

Zoölogy.—The object of the zoölogical course is primarily to give the students command of the methods of zoölogical research and study, and to derive from these their distinctive discipline. The subject is taught during the whole of the sophomore year, the course being based throughout on individual work in the zoölogical laboratory, and in the field. The results thus arrived at are supplemented by lectures and demonstrations, and by the study of text.

The more important features of the work are comparative dissections, descriptions, drawings, and microscopic preparations of types of the greater groups, as a basis for the study of the subkingdoms and their more important divisions; lectures on the comparative physiology of selected forms, with especial reference to their relations to their environment, organic and inorganic, present and past; studies of the zoölogical classification, commonly introduced by analytical synopses, exhibiting the technical relations of groups; lectures and elaborate reviews directed especially to the general

system of homologies by which zoölogical science is organized as a coherent whole; a brief course in general embryology, given with principal reference to the descent of animals, and as a preparation for later work in special embryology; and lectures on the history of zoölogical science and its final generalizations.

The *general biology* of the senior year includes comparative histology, and the embryology of the earthworm and of the chick; in plants development and reproduction in the various groups of cryptogams and phanerogams and the culture of bacteria, etc.

Geology.—During the second and third terms of the junior year two hours daily are given to the study of geology.

The plan includes lectures and recitations from the textbook, with selected readings; much practice in the determination of rock forming minerals, rocks, fossils and in making of sections and maps.

The first term is devoted to the study of the earth and its rocks, as we find them, to the discovery of the forces now acting, and their effects, and to tracing through these, the conditions under which the existing rocks were deposited.

In the second term the aim is to deduce, by means of the facts already learned, the geologic history of the earth, and the physical changes through which it has passed; to become acquainted with the succession of living forms as shown in the appearance and disappearance of their types, and to learn the location and uses of deposits of economic value.

Physiography.—Under this name a term's work is provided in general natural science, making use of the sciences of the course previously taught towards a natural history of the earth and its inhabitants, and in explanation of the general phenomena of meteorology and climatology, together with the past and present distribution of plants and animals. Anthropology is included as a part of the term's instruction.

Entomology.—The study of Entomology, pursued during a single term of the freshmen year, is necessarily made largely empirical and practical, the subject to which it is principally directed being the place of the insect world in the general system of organic life; and, incidentally to this, the relations of insects to the interests of man.

The foundation for a knowledge of structural entom-

ology is laid by the discussion and detailed study of a typical insect; and for that of the orders, by a generalization of the characters of selected groups of specimens representing each.

A large part of the time is devoted to the study of the characters, life histories, habits and economic relations of one hundred species of especially important insects. Specimens of these in their different stages, together with synopses and descriptions of the families to which they belong, are furnished the students, and the essential facts not discoverable by direct observation, are given in lectures or acquired by study of text.

Practice in field observations is given as opportunity offers, and all are taught the ordinary methods of the collection, preparation and care of specimens, together with the approved methods of controlling the ravages of the injurious species. A careful and complete description of some one species, illustrated by drawings of important parts, is made by each student and deposited in the library of the school.

Besides the collections, apparatus and entomological library of the University, the students in this course have access to the collections and library of the State Entomologist, and the practical use of the many thousand duplicate insects belonging to the office. In both field and laboratory work, an extraordinary opportunity is afforded competent students of this course to observe and assist in practical entomological work and original research.

Mineralogy.—Fourteen weeks; about six weeks are occupied in lectures on crystallography; Nauman's system of symbols is used and explained. A collection of models, comprising the most important forms and combinations in the various systems of crystalization, is used for illustration and study. The remainder of the term is occupied by the descriptive determination of minerals, and the use of the blow pipe. A very complete collection of minerals, both American and foreign, has been furnished for this purpose.

APPARATUS.

In *Botany*, the school has a collection of about one thousand species of the plants indigenous to the state of Illinois, including a very nearly complete set of the grasses; a collection of Rocky Mountain and Western plants; a

collection of plants from Dr. Vasey, Botanist of the Department of Agriculture, Washington, D. C., and others obtained by exchange from various parts of the United States. A collection of fungi contains numerous species. The greenhouses and out-door plantations furnish a large amount of illustrative material for the classes. Enlarged *papier-mache* models of flowers and fruits, exhibiting structure and development, are in the cabinet.

In *Entomology* numerous species have been contributed by the State Entomologist, who is required by law to deposit his first series of specimens in the cabinet of the University. Local collections and exchanges have increased the number to about three thousand species.

The University has about thirty compound micrcscopes, representing the best American and European makers.

Zo¨logy.—The museum is particularly fortunate in its collections in zoölogy, possessing, in mounted specimens of skeletons, nearly all the ruminants of North America, and representatives of all orders of mammals except Proboscidea; exhibiting fifty species by eighty mounted specimens, with numerous skeletons. In birds it represents all the families of North America, having two hundred and forty species, represented by over four hundred specimens. Its articulates number more than three thousand specimens; its fishes, four hundred; its radiates, three hundred, and its reptiles nearly one hundred. Sea, land and fluviatile shells are represented by seventeen hundred species. The museum also contains nearly one hundred specimens, representing the osteology of vertebrates; a large collection of the nests and eggs of birds; a collection of Indian implements; and a manikin, a dissected eye and a trachea, in *papier-mache.*

Geology.—The geological cabinet contains Prof. Ward's celebrated college series of casts of famous fossils, including the gigantic Megatherium nearly eighteen feet in length; the Elephas Ganesa with tusks ten and a half feet long; the Collossochelys Atlas,—a gigantic tortoise with a shell eight feet by six; and the Plesiosaurus Cramptoni, twenty-two and a half feet. It also contains a series of tracks in the sandstone of the Connecticut river; a large collection of carboniferous ferns from the celebrated locality at Morris, Ill.; several thousand specimens of fossils from the State Geologi-

cal Survey, and from purchase in Europe; and a large number of specimens illustrating building materials, dikes, veins, metamorphism, drift boulders, etc.; about four thousand specimens, not yet arranged, have been added during the past year.

Mineralogy.—The cabinet of minerals consists of a valuable and extensive collection of the leads of the state, and accompanying minerals; a collection of models, comprising the most important forms and combinations in the various systems of crystallization; and a very complete collection of minerals, both American and foreign.

COURSE IN SCHOOL OF NATURAL HISTORY.

Required for the degree of B. S., in School of Natural History.

FIRST YEAR.

1. Chemistry; Free-Hand Drawing; Trigonometry; French.
2. Chemistry; Free-Hand Drawing; Conic Sections; French.
3. Chemistry or Free-Hand Drawing; Economic Entomology; French.

SECOND YEAR.

1. Zoölogy; Botany; German.
2. Zoölogy; Botany; German.
3. Zoölogy; Vegetable Physiology; German.

THIRD YEAR.

1. Anatomy and Physiology; Mineralogy; German; Ancient History (optional, extra).
2. Geology; Physics; German; Mediæval History (optional, extra).
3. Geology; Physics; Modern History.

FOURTH YEAR.

1. Physiography or Biology; History of Civilization; Mental Science.
2. Microscopy or Biology; Constitutional History; Logic.
3. Biology; Astronomy; Political Economy.

In this course three terms of University Latin will be accepted in lieu of the three terms of French; and five terms of such Latin for the five terms of German.

COLLEGE OF LITERATURE AND SCIENCE.

SCHOOLS.

ENGLISH AND MODERN LANGUAGES.

ANCIENT LANGUAGES.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, Ph. D., LL. D., REGENT.

EDWARD SNYDER, M. A., *Dean;* Modern Languages.

THOMAS J. BURRILL, M. A., Ph. D., Botany.

SAMUEL W. SHATTUCK, M. A., C. E., Mathematics.

JOSEPH C. PICKARD, M. A., English Language and Literature.

JAMES D. CRAWFORD, History and Ancient Languages.

PETER ROOS, Industrial Art.

WILLIAM McMURTRIE, E. M., Ph. D., Chemistry.

STEPHEN A. FORBES, Ph. D., Entomology and Zoölogy.

JAMES H. BROWNLEE, M. A., Rhetoric and Oratory.

CHARLES W. ROLFE, M. S., Geology.

NATHANIEL BUTLER, Jr., M. A., Ancient Languages.

CURTIS B. HOPPIN, Lt. U. S. A., Military Science.

CHARLES E. EGGERT, Ph. B., Modern Languages.

ADMISSION.

Candidates for the School of English and Modern Languages will be examined in algebra, geometry, natural philosophy, physiology and botany, and the Latin mentioned below, but not the Greek. Notice is given that,

beginning with the fall term of 1887, students desiring to enter the College of Literature and Science must pass the examinations in preparatory Latin before they can be matriculated.

Candidates for the School of Ancient Languages will be examined in Greek, but not in the elements of Botany, Physiology, or Natural Philosophy. The examinations in Latin and Greek will be as follows:

LATIN.

Latin Grammar, including Prosody (Harkness', or Allen and Greenough's); Latin prose composition (forty-four exercises, to the passive voice, in Arnold's Latin Prose Composition, or parts one and two, to page 196, of Harkness' Introduction to Elementary Latin Prose Composition, or an equivalent in Allen and Greenough's Latin Composition); four books of Cæsar's Commentaries, six orations of Cicero, and six books of the Æneid. *Real equivalents* for any of the above mentioned works will be accepted.

GREEK.

Greek Grammar (Goodwin's or Hadley's), Greek Prose Composition (Jones' Exercises in Greek Prose Composition or an equivalent in Arnold's), and four books of Xenophon's Anabasis. Writing Greek with the accents will be required. *The Greek Etymology must be thoroughly learned.*

The so-called Continental sounds of the vowels and diphthongs, and pronunciation according to the accent, are recommended.

OBJECT OF THE SCHOOLS.

The object of the Schools in this College is to furnish a sound and liberal education to fit students for the general duties of life, and especially to prepare them for those business pursuits which require a large measure of literary and scientific knowledge and training. They meet the wants of those who wish to prepare themselves for the labors of the press as editors and publishers, for teachers in the higher institutions, or for the transaction of public business.

Students in the Agricultural and other Technical Schools, desiring to educate themselves as teachers, and professors, in their special departments, require a knowledge of the ancient, as well as of modern languages, to give them a full com-

mand of all the instruments and facilities required for the highest proficiency in their studies and proposed work. The University seeks through the Schools to provide for this important part of its mission—the furnishing of teachers to industrial schools of the country, and investigators and writers for the arts.

INSTRUCTION.

The plan of instruction embraces, besides the ordinary text-book study, lectures and practical exercises in all the departments, including original researches, essays, criticism, and other work intended to illustrate the studies pursued, and to exercise the student's own powers.

A prominent aim will be to teach the right use of books, and thus prepare the students for self-directed investigation and study, which will extend beyond the curriculum of his school and the period of his graduation. With this view, constant use of the already ample and continually enlarging stores of the library will be required and encouraged. As a further aid in this direction, members of the advanced classes are usually selected to act as assistant librarians. In this service they are able to obtain much valuable knowledge of various departments of literature and science, of prominent authors, and the extent and scope of their writings. Of special value as an incentive to, and the means of practice in English composition should be mentioned THE ILLINI, a semi-monthly paper edited and published by the students of the several colleges, each of which is appropriately represented in its columns A printing office has been provided in the mechanical building, and a press with a requisite supply of type.

The *Library* is well supplied with works illustrating the several periods of English, American, French, and German Literature, as also those of Ancient Literature. It contains at present over seventeen thousand well selected volumes, and is constantly growing by purchase at home and abroad. Valuable American and foreign periodicals are received regularly in the reading room. (See list on pages 30 and 31.)

SUBJECTS COMMON TO THE SCHOOLS OF THIS COLLEGE.

MATHEMATICS.

First Term.—Trigonometry, plane and spherical; fundamental relations between the trigonometrical functions of an angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications.

Second Term.— Conic sections, geometrical method. Definitions and general properties of the ellipse, hyperbola, and parabola; curvature of the conic sections. Analytical geometry, elements of. Properties and relations of the point and right line in a plane; of the conic sections.

Third Term.—Differential calculus; the differentiation of functions of a single variable; development of functions. Infinitesimals; order of an infinitesimal; the substitution of one infinitesimal for another; the limit of the ratio of two infinitesimals; the limit of the sum of infinitesimals. Integral calculus; formulas for direct integration and by substitution; integration by parts; simplification by transformation; area of a segment of a circle, of an ellipse, of an hyperbola; length of an arc of a circle, of a parabola, etc.

PHYSICS AND ASTRONOMY.

For these subjects, see College of Engineering.

NATURAL SCIENCE.

See College of Natural Science.

HISTORY AND SOCIAL SCIENCE.

The historical studies are designed to afford a general view of the history, social organization, and progress of the race. They embrace also the history of the arts and sciences, and of civilization, the principles of civil polity and law, the philosophy of history, and the principles of political economy and constitutional law.

The course occupies six terms in the Junior and Senior years of the University Course.

JUNIOR YEAR.

Ancient History of Greece and Rome, with notices of other nations; Ancient Geography; Mediæval History; Modern History; European Geography.

SENIOR YEAR.

Constitutional History of England and the United States; History of Civilization; Analysis of Historical Forces and Phenomena, Notices of the Arts and of the Inductive Science; Political Economy.

PHILOSOPHY AND LOGIC.

The studies of this department require much maturity of powers and are therefore confined to the Senior year of the University Course.

Mental Philosophy. Analysis and classification of mental phenomena; theories of perception, consciousness, imagination, memory, judgment, reason. Mental physiology, or connection of body and mind, healthful condition of thought, growth and decay of mental and moral powers. Philosophy of education, theory of conscience; nature of moral obligation; moral feeling. The Right. The Good. Practical ethics; duties. Formation of character. Ancient schools of philosophy; modern schools of philosophy. Influence of philosophy on the progress of civilization, and on modern sciences and arts.

Principles of Logic; conditions of valid thinking; forms of arguments, fallacies and their classification. Inductive and scientific reasoning; principles and methods of investigation. Practical applications of logic in the construction of arguments, in the detection and answer of fallacies, and the formation of the habits of thinking and common judgment of life.

SCHOOL OF ENGLISH AND MODERN LANGUAGES.

ENGLISH LANGUAGE AND LITERATURE.

Studies of the School.—In the arrangement of the studies the endeavor is to present a thorough and extended drill in grammatical and philological study, and in the authors and history of the English language, affording a training equiva-

lent to the ordinary studies of the classical languages. This drill extends through three years of the course.

The first two terms of the first year are given to a general survey of the whole field of British and American literature from the middle of the sixteenth century to the present time. All the representative writers come into notice, and representative specimens from the writings of each are carefully read in class. Moreover, each student is required each term to read an entire work of some classic author, making choice from a prescribed list. Frequent exercises in writing abstracts, or original compositions on themes assigned, are also required. The study of rhetoric occupies the first term.

During the second year four or five of the great masters are studied, their work analyzed, and the shaping forces of their times, with their influences upon succeeding times, are investigated. Lectures are given from time to time on poetry, epic, lyric, dramatic, etc. Writing and reading required as in first year.

In the Senior year attention is given to Old English; to the Anglo-Saxon, for which the way has been prepared by the study of both English and German, and to philology. Essays, forensics, and orations are required.

French and German.—The modern languages taught in this School are confined to one year of French and two years of German. Abundant practical exercises are given both in composition and translation, and the diligent student gains the power to read with ease scientific and other works in these languages, and may, with a little practice, write and speak them with correctness. Constant attention is also given to the etymologies common to these languages and the English, and thereby a large advantage in linguistic culture is gained by the student. "He who knows no foreign tongue," said Goethe, "knows nothing of his own."

In the first year the student passes over a complete grammar and reader, acquiring a knowledge of the technicalities of the idiom, with a sufficient vocabulary for the use of books of reference within the course. The second year is devoted to a critical study of the languages and philological analysis, and to a course of select reading, composition and conversation.

COURSE IN SCHOOL OF ENGLISH AND MODERN LANGUAGES.

Required for Degree of B. L.

FIRST YEAR.

1. Rhetoric or Cicero de Amicitia; French; Trigonometry.
2. American Authors or Livy; French; Conic Sections.
3. British Authors; French; Calculus, or Free-Hand Drawing; Horace (optional, extra).

SECOND YEAR.

1. English Classics; German; Physiology or Botany.
2. English Classics; German; Zoölogy or Botany.
3. English Classics; German; Astronomy.

THIRD YEAR.

1. German; Chemistry; Ancient History.
2. German; Physics; Mediæval History.
3. German; Physics or Chemistry; Modern History.

FOURTH YEAR.

1. Anglo-Saxon; Mental Science; History of Civilization.
2. Early English; Logic; Constitutional History.
3. Philology, Political Economy; Geology.

SCHOOL OF ANCIENT LANGUAGES AND LITERATURE.

In the School of Ancient Languages and Literature, the methods of instruction, without swerving from their proper aim, to impart a sufficiently full and critical knowledge of the Latin and Greek languages and writings, will make the study of these tongues subservant, in a more than usual degree, to a critical and correct use of the English. With this view, written translations, carefully prepared, with due attention to differences, equivalences, and substitutions of idioms, and the comparison and discrimination of synonyms, will form part of the entire course.

The study of Latin and Greek composition will constitute a weekly exercise through the first year, and will be continued, to some extent, through the course. Essays, historical and critical, will be required from time to time, in connection with the works read, and a free use of the library is urged. It is intended that each student who contemplates the course in ancient languages shall have a clear knowledge of the history of Greek and Latin Literature, and of the principal

authors in both languages. As an aid to the appreciation of the literature of the two peoples, Greek and Roman history will form an important part of the course, and will be taken up in the beginning, illustrating the works read. In the first term of the third year ancient history is taken up as a separate study, and especial attention is then given to the history of Greece and Rome, and the nations with whom they came in contact. Classes will be formed for the students who wish to carry their classical study further than the prescribed course, and every assistance will be given them.

COURSE IN SCHOOL OF ANCIENT LANGUAGES.

Required for Degree of B. A.

FIRST YEAR.

1. Cicero de Amicitia and prose composition; Iliad and prose composition; Trigonometry.
2. Livy and prose composition; Odyssey and prose composition; Conic Sections.
3. Odes of Horace and prose composition; Memorabilia and prose composition; Calculus.

SECOND YEAR.

1. Satires of Horace; Thucydides or German; Physiology.
2. Terence; Sophocles or German; Zoölogy.
3. Tactitus; Demosthenes or German; Astronomy.

THIRD YEAR.

1. Juvenal or French; Chemistry; Ancient History.
2. Quintilian or French; Physics; Mediæval History.
3. De Officiis or French; Physics; Modern History.

FOURTH YEAR.

1. Mental Science; History of Civilization; Physiography.
2. Logic; Constitutional History; Early English.
3. Political Economy; Philology; Geology.

DEPARTMENT OF RHETORIC AND ORATORY.

Particular attention is given to training in writing and speaking, and in the exercises of this department all students are required to participate. Such a course of instruction in composition and oratory is provided as makes it probable that all who complete it faithfully will be able to express their thoughts, both with voice and pen, in a clear, intelligent manner, and without affectation or embarrassment.

With the exception of the last term of the freshman

year, which is devoted to the text book of rhetoric, the required theme-writing extends over the first two years of the course, the remaining two being given to the art of oratory, including the principles of oral expression.

The number of themes from freshmen is eight, and from sophomores twelve, and each paper after correction is returned to the student to be carefully re-written. For composition the classes are divided into sections of about twenty, which meet weekly. At these meetings, questions of students are answered, the faults and merits of the essays of the preceding week are pointed out, and subjects assigned for the next week. Two lectures each term are given by the professor to the whole class, on the kind of writing involved in the next five weeks, as narration, description, argument, etc.

In oratory, the classes are also divided into sections. A critical analysis is made of some of the master-pieces of the great orators of England and America. The life and character of the orator, the circumstances that called forth the oration, his object in pronouncing it, are considered, and a study is made of his diction, sentences, paragraphs, figures of speech, etc. In addition, selections from the oration are assigned to the members of the class, which, after being well committed to memory, are carefully prepared, under the supervision of the instructor, for delivery in the presence of the whole class.

ADDITIONAL SCHOOLS,

NOT INCLUDED IN THE FOUR COLLEGES.

SCHOOL OF MILITARY SCIENCE.

PROFESSOR CURTIS B. HOPPIN,
1ST LIEUT., 2ND CAVALRY, U. S. A.

By the law of Congress, and of the State, the University is required to teach Military Tactics to its students. All able-bodied male students of the preparatory year and of college classes of the first, second, and third years are enrolled in the companies of the University battalion, and receive instruction in the following military exercises:

School of the Soldier; Manual of Arms.
School of the Company; Movements by Platoons, Firing, etc.
School of the Battalion; Ployment and Deployment of Close Columns.
Battalion and Company Skirmish Drill; Bugle Calls.
Bayonet Fencing; Target Practice.
Guard and Picket Duties of Sentinels.

CLASS IN MILITARY SCIENCE.

Classes are taught in military science and tactics, as far as is requisite for officers of the line. From these classes are selected the officers of the several companies, for which they act as instructors. The military instruction is under the charge of Lieut. Curtis B. Hoppin, a graduate of the U. S. Military Academy, and an officer of the regular army of the United States. A full supply of arms and ammunition is furnished by the war department, including 300 cadet rifles and accoutrements, two pieces of field artillery, 1,000 ball cartridges and 1,000 blank cartridges annually for target practice, with 100 cartridges and 300 friction primers for artillery.

No student is eligible to the military class until he has reached the third term of the freshman year, nor unless he is in good standing in all his studies. The course of instruction is confined strictly to two years. No student will be permitted to retain a command who does not maintain a good standing in conduct and scholarship.

The instruction and class exercises occupy about three hours each week, arranged as far as possible so as not to interfere with any other course of study. Students must be careful, however, to ascertain, before entering the military class, that the proper studies and exercises of their chosen course will not be interfered with.

Commission.—The Governor of the State is accustomed to commission as captains, by brevet, in the state militia, such graduates of the University as have completed the studies of the military classes and have obtained the requisite experience in command in the University battalion. In order to obtain the commission the student must be approved by the Faculty and pass satisfactorily an examination in military science and tactics before a committee appointed by the Faculty of the University. It is expected that in order to get the required experience in command, the members of the military class of the third or Junior year will serve as commissioned officers of the several companies of the battalion.

University Uniforms.—Under the authority of the acts of incorporation, the Trustees have prescribed that all male students, after the first term of their attendance, shall wear the University uniform. The University cap is to be worn from the first. The uniform consists of a suit and cap of cadet gray cloth. Students can procure them ready made on their arrival here. The University cap is ornamented in front with the initials U. of I., surrounded by a wreath. Students will always wear their uniforms on parade, but in their rooms and at recitation may wear other clothing.

The University library contains many books on military science, military history and engineering.

Gymnasium.—The drill hall is furnished with a full set of gymnastic apparatus, and classes in gymnastic exercises are organized in the fall and winter terms, under careful leaders. Fee, 50 cents.

The University Cornet Band is composed of students who, while members of the band, are excused from drill. Instruments and music are furnished by the University, and the band plays at drill and other college exercises.

COURSE IN SCHOOL OF MILITARY SCIENCE.

FIRST YEAR.

1. School of the Soldier and Company; Bayonet Fencing.

SECOND YEAR.

1. School of Battalion; Skirmish Drill.
2. Ceremonies and Reviews; Military Signaling; Sword Fencing.
3. Guard, Outpost, and Picket Duty; Military Signaling; Sword Fencing.

THIRD YEAR.

1. Military Administration; Reports and Returns; Theory of Fire Arms; Target Practice; Artillery Drill.
2. Organization of Armies; Art of War; Field Fortifications; Artillery Drill.

SCHOOL OF ART AND DESIGN.

PROFESSOR PETER ROOS.

This School is to subserve a two-fold purpose: 1. It affords to the students of the several colleges the opportunity to acquire such a knowledge of free-hand drawing as their chosen courses may require. 2. It offers to such as have a talent or taste for art the best facilities for pursuing studies in industrial designing or other branches of fine art. Schools of design, in Europe and in this country, have been found important aids to the higher manufactures, adding to the beauty of fabrics, and to the skill and taste of workmen.

The increased interest in the decorative arts, and in the manufactures which they require, has added new importance to the study of drawing and designing. It is the purpose to keep this school of design abreast with the best movements in this direction.

COURSE IN INSTRUCTION.

FIRST YEAR.

1. Form Analysis and Construction; Elementary Perspective; Combination Drawing.
2. Shading from Objects; Science of Perspective; Clay Modeling.
3. Drawing from Casts; Tinted Designs; Modeling of Ornaments.

SECOND YEAR.

1. Historic Styles of Ornament; Science of Color; Mould-making and Casting in Plaster.
2. Monochrome Painting; Designs from Plants; Modeling from Shaded Examples.
3. Constructive Designs; Water Color Drawing. Modeling from Nature.

Students having passed the above course may enter either of the following courses:

COURSE IN DESIGNING.

THIRD YEAR.

1. Decoration in Historic Styles; Drawing of Common Objects; Modeling.
2. Designs for Specified Material; Study of Drapery; Art Anatomy.
3. Designs for Furniture; Water Color Drawing; Art Anatomy.

FOURTH YEAR.

1. Tempera Painting; Designs for Monuments; Modeling.
2. Drawing from Life; Designs for Memorial Windows; Modeling.
3. Ecclesiastic Decoration; Emblems and Still Life in Tempera Color; Modeling or Oil Painting.

COURSE IN PAINTING.

THIRD YEAR.

1. Drawing from Statuary; Water Color Painting; Art Anatomy.
2. Imitation of Various Stuffs and Materials; Drawing from Life.
3. Painting from Groups; Sketching from Nature; Art Anatomy.

FOURTH YEAR.

1. Drawing from Life; Composition; Painting of Still Life.
2. Painting from Life; Pictures from Description.
3. Painting from Nature; Illustration of Prescribed Subjects.

As a preparation for entering the course in art and design, the study of plane geometry and projection drawing is recommended.

Topics for reading upon art subjects are given weekly.

Detailed studies and sketches such as are necessary to the successful rendering of things, will be required outside of the regular exercises.

For admission to advanced classes the student must show proficiency in preliminary work.

The authorities of the University have provided that persons not connected with the institution may join the drawing and painting classes on very moderate terms.

MUSIC.

Music constitutes no part of any University course of studies, and is therefore not provided by the Trustees. But as many students, especially young ladies, desire instruction in music, competent teachers are selected by the Trustees, and rooms are set apart for instruction.

COURSE OF INSTRUCTION.

Plaidy's Technical Studies. Kohler, Op. 151. Short Course, Op. 207, No. 1. Krug. Bertini, Op. 29. Czerney, Op. 299. Clementi, Op. 36, 37, 38. Heller, Op. 47, 49, 46. W. S. B. Matthews, Phrasing Studies; Cramer, books 1, 2, 3, 4. Gradus ad Parnassum, Clementi, Chopin, Op. 10. With works and pieces from the old masters.

TUITION.

Instruction, term of ten weeks—2 lessons a week....	$10.00
For term of ten weeks—one lessson a week.........	6.00
Practice on piano, one hour daily, per term..........	2.00

MISS ANNA E. MALONEY,

Teacher of Vocal Music and Voice Culture, follows the Italian method, giving individual instruction.

TERMS.

Ten weeks—two lessons a week....................	$12.00
Ten weeks—one lesson a week......................	7.00

No deduction on account of absence in either course, except in case of protracted illness.

Special students in music will also be charged the regular term fee charged other students of the University.

PREPARATORY CLASSES.

To meet an urgent demand, the Trustees have provided for teaching the preparatory studies lying between the work of the common school and that of the University.

Candidates for these classes should not be less than fifteen years old. They must pass satisfactory examinations in Arithmetic, Geography, English Grammar and History of the United States. The examination in these branches should be equal to that usually required for a second grade certificate for teachers. This examination may be made by county superintendents.

PREPARATORY STUDIES.

The studies taught in the preliminary year are as follows:

FOR COLLEGES OF AGRICULTURE, ENGINEERING, AND NATURAL SCIENCE.

First Term.—Algebra—(Wells'). Fundamental rules: factoring; common divisors and multiples; powers and roots;

calculus of radicals; simple equations; proportion and progression. *Physiology.*—(Cutler's). *Natural Philosophy.* (Norton's).

Second Term.—Algebra.—Quadratic equations, etc. *Geometry.*—(Chauvenet's). Plane geometry, lines, circumferences, angles, polygons, as far as equality. *English.*—Elements of composition. (Kellogg's). Ortheopy and word analysis. (Introduction to Webster's Academic Dictionary.)

Third Term.—Geometry completed, including solid geometry and the sphere. *English*, as in the second term, with addition of Goldsmith's Traveler and Deserted Village, read for analysis. *Botany.*—Gray's Manual and Lessons.

Reasonable equivalents for the work in any of the text books named will be accepted.

FOR COLLEGE OF LITERATURE AND SCIENCE.

First Term.—Algebra, as above. *Latin.*—Cicero's Orations. *Greek.*—Grammar and Reader.

Second Term.—Algebra and Geometry, as above given. *Latin.*—Virgil. *Greek.*—Xenophon's Anabasis.

Third Term.—Geometry completed. *Latin.*—Virgil's Æneid. *Greek.*—The Anabasis.

N. B.—Greek is required for only the School of Ancient Languages. The school of English and Modern Languages requires Physiology, Natural Philosophy and Botany, instead of Greek.

Students in the preparatory studies are not matriculated as members of the University. They pay no entrance fee, but are charged a tuition fee of five dollars a term, and the incidental fee of seven and a half dollars a term. They have all the privileges of the library, and of the public lectures, and are required to drill.

N. B.—No student is matriculated as a college student until all preparatory studies are completed.

ACCREDITED HIGH SCHOOLS.

The Faculty, after personal examination, appoints accredited High Schools, whose graduates may be admitted to the University without further examination within one year after date of their graduation. These must be schools of first rate character, whose courses of instruction include all

the studies required for admission to some one of the colleges of the University. On application, a member of the Faculty is sent to examine the school making application, as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. If the report is favorable, the name of the school is entered in the published list of High Schools, accredited by the University. The graduates of these schools are admitted to such of the colleges as their studies may have prepared them to enter. The appointment continues as long as the work of the school is found satisfactory. Annual reports are asked from these schools.

ACCREDITED HIGH SCHOOLS

Whose graduates are admitted to any of the colleges of the University. The public high schools in

Princeton.	Peoria.	Paris.
Lake View.	Galena.	Cairo.
Champaign, West.	Jacksonville.	Mendota.
Decatur.	Danville.	Rock Island.
Urbana.	Charleston.	Moline.
Oak Park.	Tuscola.	Freeport.
Chicago, North.	Streator.	Rockford.
Chicago, South.	Ottawa.	Lincoln.
Chicago, West.	Bloomington.	Jerseyville.
Hyde Park.	Aurora, East.	Evanston.
Springfield.		

ACCREDITED HIGH SCHOOLS

Whose graduates are admitted to either of the colleges of Engineering, Agriculture, or Natural History. The public high schools in

Marengo.	Sycamore.	Waverly.
Kankakee.	Rochelle.	Pekin.
Monticello.	Rossville.	Watseka.
Warren.	Washington.	Sheldon.
Peru.	Robinson.	

SOCIETIES.

The Literary Societies have from the opening of the University enjoyed its fostering care.

The Adelphic and Philomathean societies for men and the Alethenai for women, occupy spacious halls which the members have furnished and decorated with taste and elegance. Meetings are held on Friday evenings throughout

may be reduced to $2 per week. Some students prepare their own meals, and thus reduce expenses still further.

For estimates of annual expenses see page 98.

The Young Men's Christian Association of the University will aid new students in procuring rooms and boarding places.

LABOR.

Labor is furnished as far as possible to all who desire. It is classified into educational and remunerative labor.

Educational labor is designed as practical instruction, and constitutes a part of the course in several schools. Students are credited with their proficiency in it as in other studies. Nothing is paid for it.

Remunerative labor is prosecuted for its products, and students are paid what their work is worth. The maximum rate paid for farm, garden, and shop labor, is *ten cents*, and for that about the buildings and ornamental grounds, *eight cents per hour*. Students of sufficient experience may be allowed to work by the piece or job, and thus by diligence or skill secure more pay.

Some students who have the requisite *skill, industry and economy*, pay their entire expenses by their labor; but, in general, young men cannot count upon doing this at first, without a capital to begin with, either of skill or of money, to serve them till a degree of skill is required. As the number of students increases, it is found more and more difficult to furnish the labor needed, and students cannot count so certainly upon finding employment.

GENERAL DIRECTIONS TO STUDENTS.

Young men or women desiring a liberal education, and living at a distance from a college or university, are often puzzled to understand precisely what they will be required to know and do in order to gain admission. To such, these words are addressed:

1. Notice that a college or a university (which is properly a collection of colleges) is designed for the higher education only, and not for the study of common branches. None of the common branches, such as Arithmetic, Geography, English Grammar, Reading and Spelling, are taught in this University. These must all be finished before you come.

MAIN BUILDING

#24

LEARNING AND LABOR.

CATALOGUE AND CIRCULAR

OF THE

UNIVERSITY OF ILLINOIS,

URBANA, CHAMPAIGN COUNTY, ILL.

(POST OFFICE, CHAMPAIGN, ILL.)

1889-90.

CHICAGO:
HORNSTEIN BROS., PRINTERS.
1890.

"The leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislature of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."—*Act of Congress 1862, section 4.*

"All pupils attending the said University shall be taught, and shall study, such branches of learning as are related to agriculture and the mechanic arts, and as are adapted to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life, without excluding other scientific and classical studies, and including, for all male students, military tactics."—*Act of the Legislature of Illinois, 1873, section 6.*

"The Illinois Industrial University, located at Urbana, in Champaign county, shall, after the passage of this act, be known as the University of Illinois, and under that name and title shall have, possess, be seized of and exercise all rights, privileges, franchises and estates which have hitherto belonged to, or may hereafter inure to the said Illinois Industrial University."—*Act of the Legislature of Illniois, 1885, section 1.*

BOARD OF TRUSTEES.

"The end of all education should be the development of a TRUE MANHOOD, or the natural, proportionate, and healthful culture and growth of all the powers and faculties of the human being—physical, mental, moral, and social; and any system which attempts the exclusive or even inordinate culture of any one class of these faculties will fail of its end—it will make mushrooms and monks, rather than manhood and men."—JONATHAN B. TURNER 1853.

"Under the old system it was book in the morning, book in the afternoon, book in the evening—an unceasing round of studying what men have said *about* things. Under the better system of the various institutions for scientific and industrial education, the student passes frequently from study about things to study of the things themselves; in laboratory or work-shop, in draughting-room or museum, or in the field. Every science must now have its laboratory practice."—ANDREW D. WHITE, 1873.

FACULTY.

SELIM H. PEABODY, PH. D., LL. D.,
REGENT.

THOMAS J. BURRILL, PH. D.,
Professor of Botany and Horticulture, and Vice-President.

SAMUEL W. SHATTUCK, C. E.,
Professor of Mathematics.

EDWARD SNYDER, M. A.,
Professor of Modern Languages.

N. CLIFFORD RICKER, M. Arch.,
Professor of Architecture.

JAMES D. CRAWFORD, M. A.,
Professor of History and Ancient Languages, and Secretary.

GEORGE E. MORROW, M. A.,
Professor of Agriculture.

PETER ROOS,
Professor of Industrial Art and Designing.

IRA O. BAKER, C. E.,
Professor of Civil Engineering.

STEPHEN A. FORBES, PH. D.,
Professor of Zoölogy and Entomology.

OFFICERS AND INSTRUCTORS.

JAMES H. BROWNLEE, M. A.,
Professor of Rhetoric and Oratory.

CHARLES W. ROLFE, M. S.,
Professor of Geology.

DONALD McINTOSH, V. S.,
Professor of Veterinary Science.

NATHANIEL BUTLER, Jr., M. A.,
Professor of English Language and Literature.

ARTHUR T. WOODS,
Professor of Mechanical Engineering.

CURTIS B. HOPPIN,
First Lieut. 2nd Cavalry, U. S. A.,
Professor of Military Science and Tactics.

S. ROBERTSON WINCHELL, M. A.,
Professor of Latin.

ARTHUR N. TALBOT, C. E.,
Assistant Professor of Engineering and Mathematics.

ARTHUR W. PALMER, Sc. D.,
Assistant Professor of Chemistry.

GEORGE W. PARKER,
Instructor in Wood-work, and Foreman.

FANNY M. RYAN,
Instructor in Modern Languages.

GEORGE W. MYERS, B. S.,
Instructor in Mathematics.

OFFICERS AND INSTRUCTORS.

RUFUS ANDERSON, M. E.,
Instructor in Iron-work, and Foreman.

CLARA MAUD KIMBALL,
Teacher of Vocal and Instrumental Music.

SAMUEL W. STRATTON, B. S.,
Assistant in Architecture.

HOWARD S. BRODE,
Assistant in Zoölogy.

ETTA L. BEACH,
Assistant in Drawing.

C. EUGENE BOGARDUS, B. S.,
First Assistant in Chemistry.

HARRY S. GRINDLEY, B. S.,
Second Assistant in Chemistry.

J. V. E. SCHAEFER, B. S.,
Assistant in Machine Shop.

*LINCOLN BUSH, B. S.,
Instructor in Descriptive Geometry.

CLEAVES BENNETT,
Assistant in Library.

A. B. BAKER,
Janitor.

*For Winter Term.

State Laboratory of Natural History.

STEPHEN A. FORBES, Ph. D.,
Director and State Entomologist.

THOMAS J. BURRILL, Ph. D.,
Botanist.

CHARLES A. HART,
Office Entomologist.

JOHN MARTEN,
Field Entomologist.

FREDERICK W. MALLY, M. Sc.,
Entomological Assistant.

MARY J. SNYDER,
Stenographer.

AGRICULTURAL EXPERIMENT STATION.

BOARD OF DIRECTION.

SELIM H. PEABODY, Ph. D.,
President.

E. E. CHESTER, Champaign County,
Of State Board of Agriculture.

HENRY M. DUNLAP, Champaign County,
Of State Horticultural Society.

H. B. GURLER, De Kalb County,
Of State Dairymen's Association.

EMORY COBB, Kankakee.

CHARLES BENNETT, Mattoon.

GEORGE S. HASKELL, Rockford.

Prof. GEORGE E. MORROW, Agriculturist.

Prof. T. J. BURRILL, Horticulturist and Botanist.

THOMAS F. HUNT, B. S.,
Assistant Agriculturist.

GEORGE W. McCLUER, B. S.,
Assistant Horticulturist.

*ALBERT G. MANNS, Ph. D.,
Assistant Chemist.

†EDWARD H. FARRINGTON,
Assistant Chemist.

DONALD McINTOSH, V. S.,
Veterinarian.

W. L. PILLSBURY, M. A.,
Secretary.

*Resigned, January 1, 1890.
†After January 1, 1890.

LIST OF STUDENTS.

RESIDENT GRADUATES.

NAME.	RESIDENCE.
Bennett, Cleaves	Mattoon.
Kinkead, David R.	Earlville.
Ross, Luther S., B.S.	Reno.
Sparks, Myrtle E., B.A.	Champaign.
Stewart, Ella M.	Champaign.
Williamson, Mary H., B.L.	Champaign.

SENIOR CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Barr, James	Mechanical Engineering & Mil.	Urbana.
Bawden, Samuel D.	Mechanical Engineering & Mil.	Champaign.
Beardsley, John	Literature and Science	Champaign.
*Beckwith, Frank	Civil Engineering & Military	Quincy.
Benson, Edward M.	Civil Engineering	Colfax.
Bowsher, Col'mb's A.	Civil Engineering	Barnett.
*Boyd, Willard A.	Mechanical Engineering	Lewistown.
*Bunton, Fred L.	Mechanical Engineering	Kewanee.
Camp, Norman H.	Natural History	Chanute, Kas.
Clark, Frank H.	Mechanical Engineering & Mil.	Urbana.
Clark, Thomas A.	Literature and Science	Champaign.
Clarkson, James F.	Civil Engineering & Military	Chicago.
Clinton, George P.	Natural History	Polo.
Cooke, Robert J.	Civil Engineering & Military	East Newbern.
Cornelison, Robt. W.	Chemistry -	Washington.
Crabbs, Clarence L.	Civil Engineering & Military	Gibson City.
*Eidmann, Edw. C.	Civil Engineering	Mascoutah.
Fisher, Frank	Civil Engineering & Military	Indianola.
Gilliland, Wm. M.	Mechanical Engineering	Coatsburg.
Hanssen, G. Adolph	Architecture	Davenport, Ia.
Hazelton, Hugh	Mechanical Engineering & Mil.	Forest Glen.
Keene, Edward S.	Mechanical Engineering	Moline.
McCandless, H. W.	Mechanical Engineering	Orion.

NOTE.—A star (*) indicates that a student has not secured the full number of credits belonging to the class in which he is enrolled. He may have fallen behind this class, or he may have advanced beyond the class below.

NAME.	COURSE.	RESIDENCE.
McKee, Will E.	Mechanical Engineering	Rising.
Manny, Walter I.	Literature and Science	Mound Station.
Moore, Byron L.	Chemistry	Champaign.
Nesbit, Edwin	Mechanical Engineering	Charleston
Peoples, U. J. Linc'ln	Architecture	Alleghany City, Pa.
*Piper, Edward D.	Mechanical Engineering	Chicago.
Proctor, Orla A.	Literature and Science	Rome.
Schaefer, Philm'n A.	Civil Engineering	Parral, Mexico.
Shamel, Charles H.	Chemistry	Willey.
*Shamel, Clar'nce A.	Agriculture	Willey.
*Smolt, Franklin O.	Chemistry and Military	Paw Paw.
Snyder, C. Henry	Civil Engineering	Fulton.
Stevens, Fred W.	Chemistry	Odell.
*Storer, Frederic E.	Architecture and Military	Spring Ranch, Neb.
Terbush, Linsley F.	Literature and Science	Champaign.
Tresise, Frank J.	Civil Engineering & Military	Sharon, Pa.
Tscharner, John B.	Civil Engineering	Okawville.
Waterman, Fred W.	Mechanical Engineering & Mil	Sycamore.
White, James M.	Architecture and Military	Peoria.
Wilber, Frank D.	Literature and Science	Champaign.
Wilkinson, Geo. E.	Natural History and Military	Argenta.
Wilson, Robert C.	Natural History	Bloomington.

LADIES.

NAME.	COURSE.	RESIDENCE.
Boyle, Annie C.	Literature and Science	Champaign.
Brumbach, Lucia R.	Literature and Science	Gilman.
Clark, Edith L.	Literature and Science	Urbana.
Ellars, Jessie	Ancient Language	Tuscola.
Jones, Mabel	Literature and Science	Champaign.
Kennard, Katherine L.	Literature and Science	Champaign.
*Paine, Sarah M.	Natural History	Orizaba.

JUNIOR CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Barclay, Thomas	Chemistry	Plainfield.
Bouton, Charles S.	Chemistry	Hyde Park.
Braucher, Ernest N.	Architecture	Lincoln.
Chester, D. Hubert	Chemistry	Champaign.
Chester, John N.	Civil Engineering	Champaign.

NAME.	COURSE.	RESIDENCE.
Clarke, Edwin B.	Architecture and Military	Quincy.
Clarke, Frederic W.	Architecture and Military	Quincy.
*Crissey, John W.	Civil Engineering	Chester.
*Dinwiddie, Edwin	Mechanical Engineering	Maroa.
Eno, Frank H.	Civil Engineering & Military	Pomona, Cal.
*Fischer, Lawrence	Architecture	Oregon.
*Foster, Zebulon	Civil Engineering	Armstrong.
*Frahm, Hans	Literature and Science	Tuscola.
Frederickson, Jno. H.	Civil Engineering	Champaign.
French, Ransford M.	Architecture	Pana.
Fuller, James R.	Civil Engineering	Buda.
Gardner, Frank D.	Agriculture	Gilman.
Gibson, Charles	Civil Engineering	South Grove.
Green, Thomas S.	Natural History	Jacksonville.
*Hall, Fred A.	Chemistry	Tonica.
Harris, Jay T.	Civil Engineering	Champaign.
*Harris, William H.	Civil Engineering	Seymour.
Harvey, Alfred E.	Civil Engineering & Military	Paris.
Hay, Walter M.	Civil Engineering	Sandwich.
*Hildrup, James J.	Civil Engineering	Belvidere.
*Hobbs, Glen M.	Literature and Science	Yorkville.
Howorth, Thomas J.	Ancient Language	Chester.
Lewis, G. Felix	Mechanical Engineering	Deer Creek.
McClure, Ora D.	Mechanical Eng. and Military	Gibson City.
McCormick, Wirt	Literature and Science	Mahomet.
*Martin, William A.	Mechanical Engineering	Chicago.
Maue, August	Literature and Science	Mokena.
Merritt, Charles J.	Civil Engineering	Champaign.
Mitchell, Charles J.	Civil Engineering	Fulton.
Peabody, Lorin W.	Mechanical Engineering	Aurora.
Piatt, Herman S.	Ancient Language	Champaign.
Powell, John H.	Civil Engineering	Shawneetown.
Richart, Fredr'k W.	Mechanical Engineering	Fredonia.
*Shannon, Jas. S., Jr.	Architecture	Hinsdale.
Shattuck, Walter F.	Architecture	Champaign.
*Siebernes, John R.	Civil Engineering	Peoria.
*Spencer, James E.	Civil Engineering	Champaign.
Vail, Charles D.	Civil Engineering and Military	Lone Tree.
Wallace, R. Strawn	Mechanical Engineering & Mil.	Pontiac.
Young, Charles B.	Architecture	Aurora.

LADIES.

NAME.	COURSE.	RESIDENCE.
Beach, Laura M.	Natural History	Champaign.
Broaddus, Alice V.	Natural History	Urbana.
Butterfield, Helen E.	Literature and Science	Champaign.
Carson, Annie	Literature and Science	Urbana.
*Cunningham, Clara	Natural History	Champaign.
*Darby, Nellie M.	Literature and Science	Urbana.
*Gilman, Bessie A.	Literature and Science	Warrensburg.
*Heller, Opal B.	Literature and Science	Urbana.
Jones, Isabel E.	Natural History	Champaign.
*Maxwell, Nellie	Literature and Science	Champaign.
Myers, Clara	Literature and Science	Newport, Ind.
Shattuck, Anna F.	Literature and Science	Champaign.
Shattuck, Edith A.	Architecture	Champaign.
Sibert, Emma E.	Literature and Science	Champaign.

SOPHOMORE CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
*Aranda, Ezequiel	Mechanical Engineering	Allende, Mexico.
*Arbeiter, George	Natural History	Plainfield.
*Armstrong, Jas. L.	Ancient Language and Military	Hayes.
*Atkinson, Oloff	Architecture	Rock Island.
*Bacon, Cecil H.	Chemistry	Champaign.
*Bainum, Curtis S.	Architecture	Champaign.
*Baker, John P.	Civil Engineering	Parkersburg, Ia.
Barker, John K.	Civil Engineering and Military	Three Rivers, Mass.
Baughman, Chas. O.	Mechanical Engineering	Camp Point.
Belden, Edgar S.	Architecture	Evanston.
*Beuthien, Arnold	Mechanical Engineering	Durant, Ia.
*Bevis, Albon	Architecture	Virginia.
*Blaine, Walter C.	Chemistry	Champaign.
*Bond, Joseph E.	Mechanical Engineering	Tolono.
Burrows, Parke T.	Architecture and Military	Davenport, Ia.
*Butler, William T.	Civil Engineering	Franklin, O.
*Carnahan, Frank G.	Ancient Language	Champaign.
*Carr, Robert F., Jr.	Chemistry	Argenta.
*Carrick, William	Chemistry	Newton.
*Coffeen, Fred G.	Chemistry	Champaign.

NAME.	COURSE.	RESIDENCE.
Cross, Charles W.	Architecture	Kewanee.
*Crowell, S. Went'h	Literature and Science	Oregon.
*Dunaway, W. Alf'd	Architecture	Ottawa.
*Eastman, Chas. E.	Architecture	Petersburg.
Forbes, Robert H.	Chemistry	Princeton.
Foster, Winslow H.	Mechanical Engineer. & Mil.	Chicago.
Funston, Edm'd B.	Architecture	Fisher.
Gates, Andrew W.	Civil Engineering and Military	Earlville.
*Guenther, Alfred	Agriculture and Military	Quincy.
*Gulick, Edward E.	Literature and Science & Mil.	Mahomet.
*Gulick, Joseph P.	Literature and Science	Mahomet.
*Gunn, Charles A.	Architecture and Military	South Evanston.
*Hall, Lyman	Chemistry	Savoy.
Hallinen, Joseph E.	Natural History	Champaign.
Hammett, Wm. A.	Agriculture	Camargo.
Harris, B. Frank	Literature and Science & Mil.	Champaign.
Hart, Ralph W.	Architecture	Aberdeen, S. Dak.
*Harvey, Walter C.	Architecture	Paris.
*Heaton, Edward J.	Civil Engineering	Emden.
Herrick, Lott R.	Literature and Science	Farmer City.
*Hubbell, James P.	Architecture and Military	Davenport, Ia.
*Huff, Geo. A., Jr.	Chemistry	Englewood.
Jerry, Edward E.	Civil Engineering	Curran.
Kellogg, Edward F.	Mechanical Engineering	Champaign.
Kiler, Charles A.	Natural History	Urbana.
Klingelhoefer, Wm.	Civil Engineering	Mascoutah.
*Kramm, Harry	Mechanical Engineering	Peoria.
Lewis, George E.	Mechanical Engineering & Mil.	Chicago.
*Lockhart, John W.	Mechanical Engineering & Mil.	Owensville, Ind.
*Lockwood, F. M.	Architecture	Champaign.
McCartney, Wm. P.	Chemistry and Military	Metropolis.
McCormick, Thos P.	Mechanical Engineering	St. Louis, Mo.
McLane, Cyrus D.	Architecture	Allerton, Ia.
Mage, June B.	Literature and Science	Havana.
Mather, Roy A.	Civil Engineering and Military	Naperville.
*Merrifield, Alb't W.	Civil Engineering	Ottawa.
Miller, William G.	Mechanical Engineer and Mil.	Chicago.
Morehouse, M J.	Architecture	Mt. Pleasant, Ia.
*Morgan, John B.	Literature and Science	Kinmundy.
Morse, Burt	Architecture	Farmington.

NAME.	COURSE.	RESIDENCE.
Mosier, Jeremiah G.	Natural History	Urbana.
Nelson, Elnathan K.	Chemistry	Paris.
Page, John W.	Civil Engineering and Military	Waukegan.
*Parker, Hervey E.	Ancient Language	Champaign.
Parkman, Chas. C.	Architecture	Philo.
Pasfield, George L.	Literature and Science & Mil.	Springfield.
*Paul, William L.	Mechanical Engineering	Peoria.
*Peterson, Adolph B.	Architecture	Chicago.
*Phillips, James D.	Architecture	Englewood.
Pierce, Charles I.	Mechanical Engineering	Kewanee.
Pillsbury, Arthur L.	Civil Engineering and Military	Urbana.
*Pillsbury, Ithamar	Natural History	Macomb.
Plank, Ulysses S. G.	Natural History	East Lynne, Mo.
*Pullen, Rome	Literature and Science	Centralia.
*Quinn, Edward J.	Chemistry	La Salle.
*Reat, Samuel C.	Literature and Science	Tuscola.
Sandford, Wm. E.	Chemistry	Kewanee.
*Sargent, Ernest T.	Literature and Science	Carlinville.
*Seaman, George W.	Mechanical Engineering & Mil.	Beardstown.
Scheidenhelm, E. L.	Civil Engineering and Military	Mendota.
*Shamel, J. Young	Agriculture	Willey.
*Smith, Sherman	Architecture	Leroy.
Snodgrass, William	Mechanical Engineering	Urbana.
Steele, James	Chemistry and Military	Henry.
*Steinwedell, Wm. E.	Mechanical Engineering	Quincy.
*Stewart, John T.	Civil Engineering and Military	Onarga.
*Swenson, Bern'd V.	Mechanical Engineering & Mil.	Chicago.
*Tscharner, Frank P.	Natural History	Okawville.
*Wagner, Joseph R.	Natural History	Spring Bay.
Wait, Benj. A., Jr.	Civil Engineering	Armstrong.
*Wilder, Charles T.	Natural History and Military	Champaign.
Williamson, Fr'k R.	Civil Engineering	St. Anne.
*Woodruff, Thos. T.	Mechanical Engineering	Quincy.
*Woodworth, H. O.	Natural History	Champaign.
Wright, Royal	Literature and Science	Urbana.

LADIES.

NAME.	COURSE.	RESIDENCE.
Barber, Alice M.	Natural History	Lafox.
Bennett, Sarah	Literature and Science	Mattoon.
Boggs, Cassie	Literature and Science	Hayes.

NAME.	COURSE.	RESIDENCE.
*Ermentrout, R. L.	Literature and Science	Urbana.
*McWatty, Mattie M.	Natural History	Champaign.
Maxwell, Anne M.	Literature and Science	Champaign.
*Merritt, Luella	Literature and Science	Champaign.
*Pearman, Myrtle	Natural History	Champaign.
*Philbrick, Margr't	Natural History	Champaign.
Spencer, Julia A.	Literature and Science	Urbana.
Thompson, Susan E.	Literature and Science	Bement.
*Turnell, Amy	Natural History	Champaign.

FRESHMAN CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Andrews, Herbert F.	Natural History	Piasa.
*Armstrong, J. Wm.	Mechanical Engineering	Toulon.
Bacon, Harlow	Civil Engineering & Military	Huntsville.
*Bailey, Fred L.	Chemistry	Champaign.
Barnett, Robert C.	Mechanical Engineering	Keokuk, Ia.
*Barrett, Edw. E.	Civil Engineering	Port Byron.
Bartlett, H. Emmett	Civil Engineering & Military	Mt. Sterling.
†Bassett, Grove M.	Mechanical Engineering	Kewanee.
*Bates, Theodore	Civil Engineering	Pittsfield.
Bawden, H. H., Jr.	Ancient Language	Champaign.
Behrensmeyer, G. P.	Architecture	Quincy.
Bing, Edward W.	Chemistry	Urbana.
Blakesley, Geo. W.	Mechanical Engineering	Rock Island.
Boger, J. Fred	Civil Engineering	Camp Point.
*Bowen, Herbert L.	Civil Engineering	Kewanee.
Braucher, Herb't H.	Agriculture	Lincoln.
Brown, Frank	Natural History	Monticello.
Brown, Frank M.	Architecture	Champaign.
Brownell, Chester D.	Chemistry and Military	Champaign.
Burt, Henry J.	Civil Engineering	Urbana.
*Carpenter, Harv'y J.	Literature and Science	Urbana.
Carter, Charles W.	Natural History and Military	Aledo.
Chambers, Wm. R.	Literature and Science	Sadorus.
*Chester, O. Paul	Agriculture	Champaign.
*Clark, Cyril B.	Mechanical Engineering	Champaign.
Coffman, Birch D.	Natural History	Champaign.
Cook, James W.	Mechanical Engineering	Rock Island.

† Deceased.

NAME.	COURSE.	RESIDENCE.
Cornell, Wm. H.	Mechanical Engineering & Mil.	Grant Park.
Craig, Edward C.	Literature & Science & Mil.	Mattoon.
Crawford, Chas. F.	Civil Engineering	Chicago.
Danley, Willis W.	Civil Engineering	Hennepin.
Davis, Jonathan S.	Architecture and Military	Atwater.
*Dickinson, Rich'd J.	Civil Engineering	Eureka.
Earl, Mark A.	Civil Engineering & Military	Centralia.
*Farrar, George A.	Architecture	Quincy.
*Gilman, Richard E.	Agriculture	Warrensburg.
Graham, Louis T.	Natural History & Military	Pittsfield.
Graham, William J.	Literature and Science & Mil.	Aledo.
*Green, N. Raym'd	Civil Engineering	Champaign.
Gulick, Frank	Natural History	Urbana.
Harvey, Nathan A.	Ancient Language	Champaign.
*Herrick, George I.	Civil Engineering	Wheaton.
Hewett, Herbert E.	Architecture	Morgan Park.
Higgins, Albert G.	Architecture	Elmwood.
*Hoag, Parker H.	Architecture	Champaign.
Hopkins, Frank C.	Mechanical Engineering	Buffalo, Wyo.
Hucke, Philip M.	Natural History & Military	Mascoutah.
Hunt, Edward E.	Chemistry	Urbana.
Johnston, Herbert	Natural History	Champaign.
*Kenaga, Wm. C.	Literature and Science	Kankakee.
Kerns, Shirley K.	Chemistry	Champaign.
*Kimball, Conrad B.	Architecture	Champaign.
Kinkead, James A.	Chemistry	Earlville.
Levy, Alexander	Architecture	Brookfield, Mo.
*Levy, Frank H.	Chemistry	Urbana.
*Lewis, Adelbert	Literature and Science	Pawnee.
Locke, Alfred	Mechanical Engineering & Mil.	La Salle.
Lodge, William F.	Natural History	Monticello.
Loomis, Arthur B.	Civil Engineering	Fulton.
McClure, Clyde B.	Civil Engineering	Gibson City.
*McElroy, Howard	Civil Engineering	Rossville.
McGee, Walter S.	Natural History	Deers.
McMains, Louis	Natural History	Armstrong.
Mann, Jacob G.	Civil Engineering	Mascoutah.
Metcalf, James D.	Mechanical Engineering	Girard.
Millar, Clendon M.	Chemistry	Mattoon.
*Miltimore, Guy	Engineering	Mitchell, S. Dak.

NAME.	COURSE.	RESIDENCE.
Needham, James	Mining Engineering	Collinsville.
Parker, Charles A.	Mechanical Engineering	Champaign.
*Patton, Otto C.	Chemistry	Mt. Vernon.
Pearson, William W.	Chemistry	Springfield.
Powers, Will A.	Chemistry	Belvidere.
Rea, Alfred W.	Architecture and Military	Urbana.
*Rippon, Charles A.	Chemistry	Springfield.
Roodhouse, Jas. P.	Chemistry and Military	Carrollton.
Rowe, William B.	Ancient Language	Ottawa.
Russell, Winfred	Natural History	Champaign.
Scott, Donald G.	Civil Engineering	Champaign.
*Scott, William J.	Architecture	Champaign.
Sharpe, Richard W.	Natural History	Tiskilwa.
Shiga, Shigetsura	Architecture	Tokio, Japan.
Skielvig, Severin C.	Architecture & Military	Chicago.
*Smith, Harry K.	Mechanical Engineering	Quincy.
Smith, Riley E.	Mechanical Engineering & Mil.	Stonington.
*Somers, Bert S.	Architecture	San Diego, Cal.
Spalding, Fred M.	Civil Engineering & Military	Gibson City.
*Strout, Frank A.	Mechanical Engineering	Utica.
Tackett, William C.	Natural History	Sadorus.
Thielbar, Fred'k J.	Architecture	Peoria.
Thompson, Almon D.	Civil Engineering & Military	Gilman.
Toerring, Christ'n J.	Mechanical Engineering	Davenport, Ia.
Tominaga, Kotara	Agriculture	Tokio, Japan.
*Townsend, William	Civil Engineering	Champaign.
Troll, Ernest C.	Natural History	Oswego.
Vial, Robert C.	Civil Engineering & Military	Western Springs.
*Wade, Lenoard G.	Chemistry	Champaign.
Walker, Edward L.	Literature and Science	Petersburg.
*Watson, John B.	Mining Engineering	Opeechee, Mich.
*White, Carle B.	Chemistry	DuQuoin.
Wilhelm, Augustus	Architecture	Cincinnati, Ohio.
Young, Orres E.	Natural History	Stonington.

LADIES.

NAME.	COURSE.	RESIDENCE.
Ayers, Grace	Literature and Science	Urbana.
*Borden, S. May	Literature and Science	Champaign.
Dickinson, Grace G.	Literature and Science	Eureka.
Folger, Rachel E.	Natural History	Ridge Farm.

NAME.	COURSE.	RESIDENCE.
*Gaston, Hattie J.	Natural History	Normal.
*Harvey, Mrs. C. A.	Literature and Science	Champaign.
Johnson, Harri'te A.	Literature and Science	Rock Island.
*Kenworthy, C. F.	Literature and Science	Rock Island.
Lamkin, Nina B.	Literature and Science	Champaign.
*Mathews, L. Mae	Literature and Science	Urbana.
*Myers, Maud O.	Literature and Science	Champaign.
Peterson, Sophia M.	Literature and Science	Champaign.
Ritter, Mrs. Angie	Natural History	Mattoon.
*Sedgwick, Mary E.	Ancient Language	Champaign.
Townsend, Mary C.	Natural History	Champaign.
*Wilder, Elizab'h C.	Literature and Science	Champaign.
Wingard, Anna L.	Literature and Science	Champaign.
Yeomans, Frances A.	Literature and Science	Danville.

PREPARATORY CLASS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Adams, William E.		Charleston.
Arms, Frank D.	Architecture	Chicago.
Armstrong, John A.	Mechanical Engineering	Kewanee.
Arnold, Benj. A.	Natural History	Haldane.
Bardill, John O.		Grant Fork.
Barker, Louis G.	Mechanical Engineering	Three Riv'rs, Mass.
Bassett, John B.	Chemistry	Kewanee.
Bauman, Otto		Quincy.
Benson, Oliver N.	Architecture	Omaha, Neb.
Berry, Oren J.	Mechanical Engineering	Mendota.
Blakeslee, A. Harl'y	Mechanical Engineering	DuQuoin.
Bruer, William	Mechanical Engineering	Urbana.
Buck, James	Literature and Science	Bloomfield, Mo.
Burt, James D.	Architecture	Aurora, Neb.
Clemens, Andrew M.		Marion.
Cone, George C.	Literature and Science	Farmington.
Cornell, Frank H.	Literature and Science	Yorkville.
Crawford, John	Mechanical Engineering	Jonesboro.
Crawford, Thomas	Mechanical Engineering	Sterling.
Cunningham, Bert		Hoopeston.
Davis, Frank J.		Tremont.
Decius, Lyle	Literature and Science	Toledo.

NAME.	COURSE.	RESIDENCE.
Decius, Owen	Literature and Science	Toledo.
Dewey, George F.	Civil Engineering	Cairo.
Dunseth, William H.	Literature and Science	Urbana.
Ellsworth, Frank S.	Mining Engineering	Rochester, N. Y.
Faris, Israel J.	Mechanical Engineering	Charleston.
Foreman, Orville	Literature and Science	Pittsfield.
Foster, Alfred B.	Literature and Science	Bradford.
Fowler, David	Literature and Science	Charity.
Fraser, Wilbur J.	Architecture	Plainfield.
Funston, Jesse G.	Mechanical Engineering	Fisher.
Gill, Harry	Literature and Science	Champaign.
Goldschmidt, Otto E.	Mechanical Engineering	Davenport, Ia.
Greene, Herbert M.	Architecture	Peoria.
Gulick, Seeley		Urbana.
Hahn, Howard H.	Architecture	Freeport.
Hall, E. Stanford		East Lynn.
Hamon, William	Civil Engineering	Sedan, Kas.
Harris, George A.		Beatrice, Neb.
Hayes, A. Howard	Mechanical Engineering	Litchfield.
Heideman, Geo. H.	Mechanical Engineering	Elmhurst.
Hiles, Elmer K.	Mechanical Engineering	Chicago.
Hill, Thomas K.	Mechanical Engineering	Quincy.
Hoblit, John A., Jr.	Literature and Science	Atlanta.
Holbrook, Fred S.	Horticulture	Englewood.
Houghton, Geo. W.		Hudson.
Hughes, John W.	Literature and Science	Pierson.
Humrichouse, Geo.	Chemistry	Homer.
Ingalls, Fred O.	Literature and Science	Phœnix, Ari.
Jasper, Thomas	Mechanical Engineering	Quincy.
Kennedy, John	Civil Engineering	Murphysboro.
Kerchner, Fred W.	Mining Engineering	Belleville.
Kingman, L. S.		Peoria.
Kriete, Frank M.	Mechanical Engineering	Chicago.
Kuhnen, Adolph		Highland.
Lambert, John D.	Mechanical Engineering	Quincy.
McCloy, Robert E.	Literature and Science	Welton.
McNutt, John, Jr.	Literature and Science	Humbolt.
Miles, Tarlton V.		Charleston.
Mitchell, Gay E.	Literature and Science	Havana.
Morrow, Clar'nce G.		Champaign.

NAME.	COURSE.	RESIDENCE.
Muns, Andrew C.	Ancient Language	Champaign.
Peabody, John R.		Stonington.
Persinger, Rol'nd E.	Natural History	Maroa.
Phelps, Albert C.	Literature and Science	Lockport.
Poling, Otho C.		Quincy.
Pool, Marshall		Shawneetown.
Powell, Bradford		Carmi.
Pulliam, A. Delmar	Literature and Science	Urbana.
Russell, Chas. W.	Ancient Language	Virginia.
Rutledge, John J.	Mining Engineering	Alton.
Scherer, Willis A.	Mechanical Engineering	Raymond.
Schricker, Rich'd L.	Mining Engineering	Davenport, Ia.
Seastone, Chas. V.		New Boston.
Shillington, Thos. W.	Architecture	Omaha, Neb.
Shurts, Straut	Natural History	Champaign.
Snider, Harry H.	Mechanical Engineering	Rantoul.
Sommer, Walter B.		Quincy.
Sperling, Godfrey	Civil Engineering	Dewey.
Stowell, Hanson A.	Engineering	Anona, Fla.
Suppiger, Albert E.		Edwardsville.
Swartz, William C.	Literature and Science	Urbana.
Swigert, Arthur W.	Architecture	Springfield.
Thornton, Carl H.	Mechanical Engineering	Farragut, Ia.
Tower, Willis E.		Chana.
Trego, Charles H.	Mechanical Engineering	Hoopeston.
Whitaker, Ruben S.	Natural History	Forest City.
Wilbanks, Tanner A.		Chicago.
Wilkinson, Arthur L.		Argenta.
Williams, Scott	Mechanical Engineering	Bloomington.
Winchell Harley C.	Ancient Language	Champaign.
Withers, Willie A.	Chemistry	Englewood

LADIES.

NAME.	COURSE.	RESIDENCE.
Barnes, Jessie	Literature and Science	Champaign.
Campbell, Lena		Clinton.
Fletcher, Minnie L.	Literature and Science	Girard.
Fowler, Nellie	Literature and Science	Charity.
Gilman, Sadie G.	Literature and Science	Warrensburg.
Havard, Jennie		Homer.

NAME.	COURSE.	RESIDENCE.
Heil, Julia	Literature and Science	Decatur.
Hill, Agnes G.	Literature and Science	Nevada, Mo.
Keller, Lydia A.	Literature and Science	Monticello.
Lockhart, Emma L.		Owensville, Ind.
McCaskrin, Lou'a E.	Natural History	Rantoul.
McCormick, Flora	Literature and Science	Mahomet.
Mann, Estelle	Literature and Science	Geneva.
Nydegger, Louise	Literature and Science	Farmer City.
Parsons, Ella B.	Literature and Science	Trave, Ia.
Pettit, Anna V.	Literature and Science	Bement.
Powers, Frances M.	Natural History	Belvidere.
Powers, Jessie L.	Literature and Science	Belvidere.
Scott, Anna M.	Literature and Science	Champaign.
Trenchard, Frances	Literature and Science	Deland.

SPECIALS.

GENTLEMEN.

NAME.	COURSE.	RESIDENCE.
Allen, David H.	Agriculture	Delavan.
Baldwin, Wm. H.	Agriculture	Delavan.
Brown, Fred G.	Architecture	Urbana
Clark, Rev. Thornton	Literature and Science	Champaign.
Ellis, Edwin B.	Architecture	Ridge Farm.
Lay, E. Herman	Ancient Language	Fulton.
Phelps, Herbert	Agriculture	Lockport.
Stritesky, Louis	Architecture	Tabor, Wis.
Thomas, William S.	Agriculture	Camp Point.
Yamada, Sitzuro	Chemistry	Wakamatzu, Japan.

LADIES.

NAME.	COURSE.	RESIDENCE.
Cranston, Mary E.	Art and Design	Gibson City.
Sim, Anna	Art and Design	Urbana.
Wilber, Ella	Art and Design	Champaign.

SUMMARY.

BY CLASSES.	GENTLEMEN.	LADIES.	TOTAL.
Resident Graduates	3	3	6
Seniors	45	7	52
Juniors	45	14	59
Sophomores	95	12	107
Freshmen	101	18	119
Preparatory	93	20	113
Special	10	3	13
Total	392	77	469
BY COURSES.			
Agriculture	14	......	14
Mechanical Engineering	78	......	78
Civil Engineering	71	......	71
Mining Engineering	6	......	6
Architecture	60	1	61
Chemistry	40	......	40
Natural History	37	16	53
Art and Design	......	3	3
English and Modern Languages	50	51	101
Ancient Languages	12	3	15
Not Specified	24	3	27
Total	392	77	469

UNIVERSITY OF ILLINOIS.

HISTORY.

The University of Illinois had its origin in a movement for the higher education of the industrial classes, begun in Illinois in 1851, and resulting in the congressional grant of lands for this purpose, made to the several states in 1862, and amounting in this state to 480,000 acres. The University was chartered in February, 1867, and opened to students in March, 1868. In addition to the endowment from the land grant, over $400,000 was donated by Champaign county in bonds, buildings, and farms. The state also has made large appropriations for fitting up and stocking the farms, for library and apparatus, and for buildings, including the large main building erected in 1872 and 1873, the mechanical building, the chemical laboratory, and a commodious military building finished in 1890. Successive colleges and schools have been added as required, until four colleges, including eleven distinct schools, have been organized.

The whole number matriculated as students since the opening is 2,486. The number graduated from the several colleges, including the class of 1889, is 600. In 1871 the University was opened for lady students, on the same terms as to gentlemen. In 1874 a fine art gallery was established.

The University has a beautiful and healthful situation on the high grounds between the cities of Champaign and Urbana, within the corporate limits of the latter. It is one hundred and twenty-eight miles south from Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railways. The country is a region of beautiful rolling prairies, with large belts of timber along the streams, and is one of the richest farming districts of the state.

BUILDINGS AND GROUNDS.

The land occupied by the University and its several departments embraces about 610 acres, including stock farm, experimental farm, orchards, forest plantation, arboretum, ornamental grounds, and military parade grounds.

The main University building, designed wholly for public uses, occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. The library wing contains in spacious halls the museum of natural history, the library, the art gallery, and the museum of industrial art. The chapel wing contains the chapel, the physical laboratory and lecture room, and rooms occupied by the schools of architecture and of art and design. In the main front are convenient class-rooms, with, on the upper floor, elegant halls for literary societies. The building is warmed by steam.

The mechanical building is of brick, 126 feet in length, and 88 feet in width. It contains a boiler-room, a machine shop, furnished for practical use with a steam engine and lathes, and other machinery; pattern and finishing shop; testing laboratory; shops for carpentry and cabinet work, furnished with wood-working machinery. The blacksmith shop, 32 by 36 feet, contains sixteen forges with anvils and tools, and a cupola for melting iron.

The chemical building, erected in 1878, at a cost, including furniture, of $40,000, contains five laboratories, and is one of the best and largest in the United States.

A new military building, erected in 1889–90, 100 by 150 feet in one grand hall, gives ample space for company and battalion maneuvers and for large audiences upon special occasions.

There are, in addition, a veterinary hall, a small astronomical observatory, two dormitories, three dwellings, two large barns, and a greenhouse.

MUSEUMS AND COLLECTIONS.

The museum of zoölogy and geology occupies a hall sixty-one by seventy-nine feet, with a gallery on three sides, and is completely furnished with wall, table and alcove cases. It already contains interesting and important collections, equaled at few, if any, of the colleges of the West. They have been specially selected and prepared to illustrate the courses of study in the school of natural history, and to present a synoptical view of the zoölogy of the state.

Zoölogy.—The mounted *mammals* comprise an unusually large and instructive collection of the ruminants of our

country, including male and female moose, elk, bison, deer, antelope, etc.; and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents, and good represented marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens.

The collection of mounted *birds* (about five hundred and fifty specimens of three hundred species) includes representatives of all the orders and families of North America, together with a number of characteristic tropical forms. Many of these specimens are excellent examples of artistic taxidermy. A series of several hundred unmounted skins is available for the practical study of species.

The set of *skeletons* contains examples of all the orders of mammals and birds except proboscidæ, together with typical representatives of the principal groups of reptiles, amphibians and fishes.

The *cold-blooded vertebrates* are also represented by a very useful collection of alcoholic specimens, plaster casts, and mounted skins of the larger species, both terrestrial and marine.

Embryology is illustrated by a set of Ziegler wax models, and several series of slides, sections and other preparations.

Conchology is illustrated by several thousand shells belonging to seventeen hundred species; together with alcoholic specimens of all classes and orders. The collection of Illinois shells is fair, but incomplete.

The *entomological cabinet* contains about three thousand species (principally American) named, labeled, and systematically arranged.

The *lower invertebrates* are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

Geology.—The geological collection comprises many of the largest and most remarkable fossils hitherto discovered in the various geological formations, illustrating the general progress of life in the mollusks, fishes, reptiles, and mammals, from the oldest palæozoic time to the present. A fine set of fossils from Germany, and collections suitably arranged for practical study, from this and other states, illus-

trate the different formations. There is a good collection of foot-prints from the Connecticut river sand-stones.

Botany.—The herbarium contains about one thousand species of plants indigenous to Illinois, including nearly complete sets of grasses and sedges. There are, besides, many other North American plants and some exotics. A collection of fungi, includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees, well illustrates the varieties of native wood. The trees and shrubs of Stephenson county, Illinois, are represented by a distinct collection.

Plaster casts represent fruits of many of the leading varieties, as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

Lithology.—This collection embraces the principal kinds of metamorphic and volcanic rocks; examples of stratification in the limestone and fragmental kinds, with many samples of such rocks as are found most valuable for building purposes.

Mineralogy.—The specimens of minerals show all the groups, and all the important and typical species. All the metals are represented, also many of their most important combinations. Many of the specimens are finely crystalized; these, with a complete set of imported models, fully illustrate crystalography.

Agriculture.—A collection of soils from different portions of Illinois and other states; many varieties of corn, wheat, and other cereals and seeds; specimens illustrating the official state inspection of grains at Chicago, showing the quality of the different grades recognized; models of agricultural inventions; models illustrating modes and materials for drains; casts of ancient plows; engravings, lithographs and photographs of typical animals of noted breeds.

The farms give good illustrations of farm buildings, implements, machinery, modes of culture, and of domestic animals of various classes.

Physics.—The cabinets of the physical laboratory contain a collection of apparatus from the most celebrated European and American makers, illustrating the subjects of mechanics, pneumatics, optics, and electricity. Ample facilities

are afforded to students for performing experiments of precision by which the theories of physical science may be tested and original work may be done.

A five-light Weston dynamo at the machine shop is connected with the physical and chemical laboratories for experimental purposes, and is supplemented by a valuable series of instruments for accurate electrical measurements.

A series of standard weights and measures from the office of the Coast and Geodetic Survey of the United States may be consulted at the physical laboratory.

The Mechanical Laboratory is provided with a steam engine, engine and hand lathes, planer, shapers, milling-machine, drill presses, and the requisite hand tools, benches, vises, anvils, etc., for pattern-shop, blacksmith shop, moulding-room, and bench work. Its cabinets contain several hundred models of elements of mechanism and machines from Schroeder, Riggs, the Patent Office, and from the workshops of the University. Important additions to the equipment of tools and machines have lately been made, including a testing machine of most approved design, having a capacity of 100,000 pounds, and a mercury column for accurate testing of water and steam-gauges.

Mining Engineering is illustrated by a valuable series of models, obtained from Freiburg, illustrating sections of mines, machinery for elevating and breaking ore, with furnaces and machinery for metallurgical processes.

An extensive mining and metallurgical laboratory is in process of arrangement. A considerable portion of the machinery is already in working condition.

ART GALLERY.

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a beautiful hall, 61 by 79 feet, and the large display of art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full-size casts of celebrated statues, including the Laocoön group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over four hundred pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly

all the modern schools. Also a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France. The value of this splendid collection, as a means of education, is shown in the work of the school of drawing and design of the University.

MUSEUM OF INDUSTRIAL ARTS.

A large room is devoted to a museum of practical art, the materials for which are constantly accumulating in the various schools of science. Prominent among the agricultural specimens here exhibited is an excellent collection of the sub-species and varieties of Indian corn, including the best of their kinds, a considerable collection of small grains and of grasses, a collection of fibers in various states of manufacture, and a series of analyses of grains showing at a glance the elements and proportion of structure. The museum contains full lines of illustrations of the work of the shops; models made at the University or purchased abroad; drawings in all departments; Patent Office models, etc., samples of building materials, natural and artificial; a large collection illustrating the forestry of Illinois, Florida, and California; with whatever may be secured that will teach or illustrate in this most important phase of University work. The elegant exhibit made by the University at the Centennial and Cotton Exposition at New Orleans finds a permanent abode in this apartment.

A notable feature of this collection is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster, and a complete set of drawings, of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy. The monument was to be of white marble, an elaborate gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter millions of francs. The design was placed by the art committee second on a list of 289 competitors; but both the first and second were set aside for political reasons. Mr. Gay's generous gift occupies the place of honor in the museum of industrial arts.

LIBRARY.

The library, selected with reference to the literary and scientific studies required in the several courses, includes about 19,000 volumes, and additions are made every year.

The large library hall fitted up as a reading room, is open throughout the day for study, reading, and consulting authorities. It is intended that the use of the library shall largely supplement the class-room instruction in all departments. Constant reference is made in classes to works contained in the library, and their study is encouraged or required. The reading room is well provided with American, English, French, and German papers and periodicals, embracing some of the most important publications in science and art. The following periodicals are regularly received:

PERIODICALS IN THE LIBRARY, 1890.

AGRICULTURAL AND HORTICULTURAL.

Prairie Farmer.
Western Rural.
Country Gentleman.
Breeder's Gazette.
Indiana Farmer.
American Agriculturist.
Western Agriculturist.
Farm and Home.
Farmers' Review.
Hellenike Georgia.
Veterinary Journal.
Industrialist.
Farm, Field and Stockman.
Rural New Yorker.
Fruit Growers' Journal.
American Garden.
Wisconsin Agriculturist.
Rural World.
American Florist.

ENGINEERING.

Builder, *London.*
American Engineer.
Trans. Am. Soc. of Civil Engineers.
Engineering News.
Scientific American.
Scientific American Supplement.
Electrician, *London.*
Engineering and Building Record.
School of Mines Quarterly.
Car and Locomotive Builder
American Architect.
American Machinist.
Western Manufacturer.
Gazette of Patent Office.
Mechanics.
Locomotive.
American Artisan.

SCIENTIFIC.

Annales des Sciences Naturelles, Botanique, *Paris.*
Annales des Sciences Naturelles, Zoölogie, *Paris.*
Science.
Nature, *London.*
American Naturalist.
Grevillea, *London.*
Decorator and Furnisher.
Art Amateur.
Portfolio, *London.*
Chemical News, *London.*
Journal of Chemical Society, *London*
Annals and Magazine of Natural History, *London.*
Zeitschrift für Analytische Chemie.
Popular Science Monthly.
American Journal of Mathematics.
American Journal of Science and Art.
Journal of Franklin Institute.
Mathematical Quarterly.
Annals of Mathematics.
Monthly Weather Review.
Proceedings of American Philosophical Society.
Lancet, *London.*
Geological Magazine.
Journal of Military Service.
American Journal of Chemistry.
Boston Journal of Chemistry.

LITERARY AND NEWS.

Andover Review.
Nineteenth Century.
Edinburg Review.
Contemporary Review.
Fortnightly Review.
North American Review.
Forum.
Dial.
Literary World.
Education.
Legal Adviser.
Political Science Quarterly.
Congressional Record.
Champaign Times.
Musical Record.
Witness.
Library Journal.
United States Government Publications.
The Writer.
Voice (Elocution).
Champaign County Herald.

The exchanges of the *Illini* are also free to the students in the library.

GEOGRAPHICAL POSITION OF THE UNIVERSITY.

The Observatory has the following position:
Latitude, 40° 6′ 29″.66.
Longitude, west of Washington, 11° 10′ 37″.5. or 44m. 42.5s.
Elevation above sea level, 720 feet.

Organization of the University.

The institution is a University in the American sense, though differing designedly in the character of some of its colleges from the older institutions of this country. It embraces four colleges, which are subdivided into schools. A school is understood to embrace the course of instruction needful for some one profession or vocation. Schools that are cognate in character and studies, are grouped in the same college. The following are the colleges and schools:

I. College of Agriculture.

II. College of Engineering.

School of Mechanical Engineering.

School of Civil Engineering.

School of Mining Engineering.

School of Architecture.

III. College of Natural Science.

School of Chemistry. School of Natural History.

IV. College of Literature and Science.

School of English and Modern Languages.

School of Ancient Languages.

V. Additional Schools.

School of Military Science. School of Art and Design.

Vocal and instrumental music are also taught, but not as parts of any regular course.

Preparatory Classes.

To meet an urgent demand, the Trustees have temporarily provided for teaching the preparatory studies lying between the work of some of the common schools and that of the University.

College of Agriculture.

FACULTY AND INSTRUCTORS.

Selim H. Peabody, Ph. D., LL. D., Regent.
George E. Morrow, A. M., *Dean*, Agriculture.
Thomas J. Burrill, Ph. D., Botany and Horticulture.
Samuel W. Shattuck, C. E., Mathematics.
Edward Snyder, A. M., Modern Languages.
James D. Crawford, A. M., History.
Peter Roos, Industrial Art.
Stephen A. Forbes, Ph. D., Zoölogy and Entomology.
James H. Brownlee, A. M., Rhetoric and Oratory.
Arthur W. Palmer, Sc. D., Chemistry.
Donald McIntosh, V. S., Veterinary Science.
Charles W. Rolfe, M. S., Geology.
Nathaniel Butler, Jr., A. M., English Language and Literature.
Curtis B. Hoppin, Lt. U. S. A., Military Science.
George W. Parker, Wood-work.

ADMISSION.

Candidates for admission to the College of Agriculture must be at least fifteen years of age, and must pass satisfactory examinations in the common school branches and in the studies of the preliminary year. While by law students may be admitted at fifteen years of age, in general it is much better that they shall be eighteen or twenty. It will be well if candidates shall have pursued other studies besides those required for admission. The better the preparation the more profitable the course.

OBJECT OF THE COLLEGE.

The aim of this college is to educate scientific agriculturists and horticulturists. The frequency with which this aim is misunderstood, demands that it shall be fully explained. Many, who look upon agriculture as consisting merely in the manual work of plowing, planting, cultivating, and harvesting, and in the care of stock, justly ridicule the idea of

teaching these arts in a college. The practical farmer who has spent his life in farm labors, laughs at the notion of sending his son to learn these from a set of scientific professors. But all this implies a gross misunderstanding of the real object of agricultural science. It is not simply to teach *how* to plow, but the reason for plowing at all—to teach the composition and nature of soils, the philosophy of plowing, of manures, and the adaptation of the different soils to different crops and cultures. It is not simply to teach *how* to feed, but to show the composition, action and value of the several kinds of food and the laws of feeding, fattening and healthful growth. In short, it is the aim of the true agricultural college to enable the student to understand thoroughly all that man can know about soils and seeds, plants and animals, and the influences of light, heat, and moisture on his fields, his crops, and his stock; so that he may both understand the reason of the processes he uses, and intelligently work for the improvement of those processes. Not "book farming" but a knowledge of the real nature of all true farming, of the great natural laws of the farm and its phenomena—this is the true aim of agricultural education. Agriculture involves a larger number of sciences than any other human employment, and becomes a fit sequence to any collegiate training.

The steady aim of the trustees has been to give the College of Agriculture the largest development practicable, and to meet the full demand for agricultural education, as fast as it shall arise. Agricultural students are especially invited to the University.

Boards of agriculture and agricultural and horticultural associations are invited to co-operate with the University in its efforts to awaken a more general appreciation of the value of education, and to aid those who desire to avail themselves of its facilities for instruction.

INSTRUCTION.

The instruction unites, as far as possible, theory and practice—theory explaining practice and practice illustrating theory. The technical studies are taught mainly by lectures with readings of standard agricultural books and periodicals, and frequent discussions, oral and written, of the principles

taught. These are also illustrated by demonstrations and observations in the fields, stables, orchards, gardens, plant-houses, etc.

SPECIAL STUDIES.

Elements of Agriculture.—Outline of the general principles underlying agriculture in its theory and practice, introductory to the technical and scientific studies of the course.

Agricultural Engineering and Architecture.—Arrangement of the farm; its improvement by mechanical means, as drainage and irrigation; its divisions, fences, hedges, etc.; its water supply; the construction of roads; arrangement, planning, and construction of farm buildings; the construction, selection, care, and use of farm implements and machinery.

Animal Husbandry—Principles of breeding and management of our domestic animals; description of all important breeds and varieties, giving their history and adaptations.

Rural Economy.—Relation of agriculture to other industries and to national prosperity; influences which should determine the class of farming to be adopted; comparisons of special and general systems; uniting of manufacturing with farming; culture of the various farm crops—cereals, grasses, etc.; farm accounts.

History of Agriculture.—Progress and present condition in this and in other countries. Influence of climate, civilization, and legislation in advancing or retarding. Agricultural literature and organizations.

Rural Law.—Business law; laws especially affecting agriculture—tenures of real estate; road, fence, drainage laws, etc.

Elements of Horticulture.—The following topics are discussed: Orchard sites; the age of trees to plant; the season to plant; how to plant; what to plant; the management of the soil; pruning and care of trees; gathering and preserving fruit; diseases and injuries; the nursery; ornamental trees and shrubs; flower gardens; vegetable gardens, including propagating beds and houses; the vineyard and small fruits, and timber tree plantation. Students have instruction and practice in grafting, budding, propagation by cuttings, etc. Each student has usually grafted from two hundred to one thousand root-grafts of apples.

Landscape Gardening.—Lectures are given upon the general principles of the art, the history, and the styles, the kinds and uses of trees, shrubs, grasses, and flowers, the introduction and management of water, the construction and laying out of drives and walks, fences, buildings, etc. The class draw first from copy, then, after the actual study of some locality with its environments, design and draw full plans for its improvement, indicating positions of all prominent objects, including the kinds and groups of trees and other plants. These plans, with specifications, are to be deposited in the library of the school. Excursions are made when found practicable, for the study of public and private grounds.

The three following studies constitute a year's work designed for those who wish to prepare themselves for special horticultural pursuits, and may be taken as substitutes for agricultural or veterinary studies:

Floriculture.—The study of the kinds, propagation, growth, and care of flowering and other ornamental plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatments. Insects and diseases, with the remedies, are thoroughly treated, and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice.

Pomology and Forestry.—Much of the first half of the term is spent in the orchards, nurseries, and forests, making observations and collections, and in the laboratory work determining species, varieties, etc. A large collection of apples, pears, grapes, peaches, etc., is made each year, and the chief characteristics of each are pointed out. Practice is had in making drawings and plaster casts. Written descriptions of the fruits are carefully made and compared with those given in the books, and systems of analysis and classification are put to practical tests. Students see and perform the skilled operations usually practiced in the propagation and growth of trees. Various methods of pruning and training, especially of grapes, are discussed in the class-room, and illustrated upon the grounds. Students study the injurious insects and fungi which cause or accompany diseases of trees and fruits, and the methods of preventing or diminishing their ravages. The

native forests of the vicinity and of the country at large are studied as a foundation for the lessons upon the influence and value of timber and other trees and their artificial culture. For the latter, the forest tree plantation on the University grounds, and the aboretum, afford practical illustrations.

Plant-Houses and Management.—This study includes gardening and landscape architecture; the methods of construction, heating and ventilation, and general management, so as to secure, under the different circumstances, the best plant growth. The class-room work consists of lectures and architectural designing and drawing. Illustration and practice are afforded by the plant-houses of the University.

VETERINARY SCIENCE.

This science is taught during the third year. In the first term the anatomy and physiology of the domestic animals are taught by lectures, demonstrations, and dissections. Post-mortems of healthy and diseased animals are made, so that the students may become practically acquainted with the tissues in health and in disease. The second term is devoted to the study of veterinary medicines, their action and uses, and to lectures on the principles and practice of veterinary science. During the entire year practical instruction is given in clinical work at the veterinary infirmary, where animals are treated or operated on free of charge, for the instruction of the students. Lectures are given on veterinary sanitary science and the principles and practice of veterinary surgery.

A veterinary hall and stable have been provided and a clinic is held to illustrate the lectures on veterinary science. The department has Dr. Auzoux's celebrated complete model of the horse in 97 pieces, exhibiting 3,000 details of structure; also *papier maché* models of the foot and the teeth of the horse at different ages.

Students desiring to pursue the study of veterinary science further than is laid down in the agricultural course, will find ample facilities for so doing.

LABORATORY WORK.

Experiments and special investigations by each student. A thesis is required embodying the results of original observation and research.

For details as to the study of botany, chemistry, zoölogy, entomology, geology, and meteorology, see statements in *College of Natural Science.*

APPARATUS.

The college has for the illustration of practical agriculture, a stock farm of 400 acres, provided with a large stock-barn fitted up with stables, pens, yards, etc.; also an experiment farm of 180 acres, furnished with all necessary apparatus to illustrate the problems of breeding and feeding. It has fine specimens of neat cattle, Shorthorns, Herefords, Holsteins, and Jerseys, and of Poland-China swine. The Agricultural Experiment Station, recently established as a department of the University, exhibits field experiments in the testing of the different varieties and modes of culture of field crops and in the comparison and treatment of soils. It includes experiments in agriculture and horticulture, under the direction of the professors of agriculture and horticulture, and experiments in feeding animals of different ages and development, upon the various kinds of food. In common with similar departments in the several agricultural colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science.

Surveying and drainage are illustrated by field practice, with instruments and by models. Agricultural chemistry is pursued in connection with laboratory practice, in the analysis of soils, fertilizers, foods, etc. The college has fine collections of soils, seeds, plants, implements, skeletons of domestic animals, charts, and other apparatus, including a large number of models of agricultural machinery.

Upon the grounds devoted to the use of the college there are:

A very large specimen apple orchard, planted in 1869, and originally containing about 1,000 varieties—many varieties of pears, cherries, grapes, and small fruits.

A forest tree plantation, embracing the most useful kinds of timber.

An aboretum, in which all hardy indigenous and exotic trees are planted as fast as they can be secured, and which now contains nearly 100 varieties. The ornamental grounds which surround the University building contain about twenty acres, and are kept in neat and attractive style.

These, with all the adjuncts of trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks of different materials and styles of laying out, give illustration to the class-room work in landscape gardening. A greenhouse contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in greenhouse management.

The cabinet contains a series of colored plaster-casts of fruits prepared at the University; models of fruits and flowers by Auzoux, of Paris; collections of seeds of native and exotic plants; of specimens of native and foreign woods; of beneficial and injurious insects, and specimens showing their work; numerous dry and alcoholic specimens and preparations; maps, charts, diagrams, drawings, etc.

The college has a supply of compound microscopes and apparatus, and students have opportunity to learn their use, and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungous parasites which cause disease to cultivated crops.

AGRICULTURAL COURSE.

Required for the degree of B. S., in College of Agriculture.

FIRST YEAR.

1. Elements of Agriculture; Chemistry; Trigonometry; Shop practice (optional).
2. Elements of Horticulture; Chemistry; British Authors, or Free Hand Drawing.
3. Economic Entomology; Chemistry; Rhetoric.

SECOND YEAR.

1. Chemistry and Laboratory Practice; Botany; German.
2. Agricultural Chemistry (Soils and Plants); Zoölogy or Botany; German.
3. Agricultural Chemistry (Tillage, Fertilizers, Foods); Vegetable Physiology; German.

THIRD YEAR.

1. Agricultural Engineering and Architecture; Animal Anatomy and Physiology; German.
2. Animal Husbandry; Veterinary Science; Veterinary Materia Medica (optional extra); Physics or Geology.
3. Landscape Gardening; Veterinary Science; Physics or Geology.

FOURTH YEAR.

1. Physiography; Mental Science; History of Civilization.
2. Rural Economy; Constitutional History; Logic.
3. History of Agriculture and Rural Law; Political Economy; Laboratory Work.

N. B.—Students in Horticulture will take the special branches in horticulture described on pages 38, 39, and 40.

FARMERS' SHORT COURSE.

Students who have not the time necessary for the full course, and yet desire better to fit themselves to be successful farmers, may give exclusive attention to the technical agricultural studies, including veterinary science, and complete these in one year.

The studies of the second or winter term of this course, are arranged so as to be studied profitably by those who can be in attendance only during that term.

Students will be admitted to this course on passing a satisfactory examination in the common school branches, but they will receive greater benefit from it if they have made better preparation, especially if they have a good knowledge of botany and chemistry. They should not be less than eighteen years of age. Special fee, $5 per term.

They will be admitted to the following classes:

1. Elements of Agriculture; Agricultural Engineering and Architecture; Animal Anatomy and Physiology; Shop Practice.
2. Animal Husbandry; Rural Economy; Veterinary Science.
3. History of Agriculture and Rural Law; Veterinary Science; Economic Entomology or Landscape Gardening.

College of Engineering.

SCHOOLS.

MECHANICAL ENGINEERING; CIVIL ENGINEERING; MINING ENGINEERING; ARCHITECTURE.

FACULTY AND INSTRUCTORS.

Selim H. Peabody, Ph. D., LL. D., Regent.
N. Clifford Ricker, M. Arch., *Dean*; Architecture.
Samuel W. Shattuck, C. E., Mathematics.
Edward Snyder, A. M., Modern Languages.
James D. Crawford, A. M., History.
Peter Roos, Industrial Art and Design.
Ira O. Baker, C. E., Civil Engineering.
Arthur W. Palmer, Sc. D., Chemistry.
James H. Brownlee, A. M., Rhetoric and Oratory.
Charles W. Rolfe, M. S., Geology.
Arthur T. Woods, Mechanical Engineering.
Arthur N. Talbot, C.E., Engineering and Mathematics.
Rufus Anderson, M. E., Iron Work.
George W. Parker, Wood Work.
Curtis B. Hoppin, U. S. A., Military Science.

ADMISSION.

Applicants should be at least eighteen years of age. None are admitted under fifteen. The requirements for admission embrace the common school branches and the studies of the preliminary year. The examinations in mathematics are especially thorough.

Those who make further preparation than that required before entering can make their course more extensive and profitable. The following suggestions are offered to such as wish to make thorough work:

Either French or German are studied during two years; some preparation in Latin will be of great assistance in these

MECHANICAL BUILDING

languages. The engineer and architect should be adepts in the various departments of drawing, and some previous study of this branch will be of great advantage. Faunce's Mechanical Drawing may be used as a text book, and the drawings made on smooth paper, eight by ten inches.

The subjects common to all the schools in the College of Engineering are here described; the topics peculiar to each will be noticed under their specific names.

PURE MATHEMATICS, FIRST YEAR.

Trigonometry.—Plain and spherical. Fundamental relations between trigonometrical functions of angles or arcs; construction and use of tables; solution of triangles; projection of spherical triangles; angles as functions of sides and sides as functions of angles; general formulas; applications.

Analytical Geometry.—The point and right line in a plane; conic sections, their equations and properties; the tangent and sub-tangent, normal and sub-normal, pole and polar, supplementary chords, conjugate diameters, etc. Discussion of the general equation of the second degree containing two variables.

Advanced Algebra.—Functions and their notation; series and the theories of limits; imaginary quantities; general theory of equations.

PURE MATHEMATICS, SECOND YEAR.

Differential Calculus.—Rules for the differentiation of functions of a single variable; successive differentiation; development of functions; maxima and minima of functions of a single variable; differentials of an arc, plane area, surface and volume of revolution; elementary discussion of higher plane curves; the spirals, logarithmic curve, trochoid, etc.; algebraic curves.

Integral Calculus.—Integration of elementary forms and rational fractions; rectification of plane curves; quadrature of plane areas and surfaces of revolution; cubature of solids of revolution.

Advanced Analytical Geometry.—Loci in space; in point, right line, plane, and surfaces of the second order.

Advanced Calculus.—Development of the second state of functions of any number of variables; differential equa-

tions; maxima and minima of functions of two or more variables; construction and discussion of curves and surfaces; integration of irrational and transcendental differentials and of differential equations of the higher orders and degrees; applications; elements of elliptic integrals.

APPLIED MATHEMATICS.

Analytical Mechanics.—Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems of forces; center of gravity; moment of inertia; rectilinear and curvilinear motion and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy, and power; mechanical advantage; friction; application of these principles and methods to the solution of numerous and varied engineering problems.

Resistance of Materials.—Elasticity of materials; stresses and strains; experimental laws; working strength for different materials; resistance of pipes and riveted joints; bending and resisting moment, shear, and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion, and shafts; maximum internal stresses in beams; fatigue of metals; working strength for repeated stresses; resilience; reliability of the common theory of flexure as shown by actual experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing.

Hydraulics—Weight and pressure of water; head; center of pressure, velocity and discharge through orifices, weirs, tubes, pipes, conduits, canals, and rivers; measurement of pressure, velocity, and discharge; water power.

Projection Drawing.—Use of drafting instruments in the elements of mechanical drawing; geometric constructions; orthographic projection and representation of objects; sections; isometric drawing; cabinet projection and false perspective; use of water colors; conventional signs; drawings finished by line shading and by colors; miscellaneous plans and drawings.

Free Hand Drawing.—Outline sketches; drawing from casts; sketches of machines, etc.

Lettering.—Plain and ornamental alphabets; titles and title pages; round and stump writing.

Descriptive Geometry.—Problems on the point, right line, and plane; single-curved surfaces; double-curved surfaces; development and intersections; shades and shadows; perspective; numerous and varied practical problems requiring the application of these principles and methods.

PHYSICS.

The course of physics embraces the kinds of work following:

1. Recitations, in which a text book is used as a guide.

2. Experiments in the physical laboratory, in which the student uses the instruments in testing the principles taught.

3. Illustrated experiments once each week, in which the more costly apparatus is used before the whole class in such experiments as are difficult to perform, and which are more effective when prepared for an audience.

4. Higher physical experiments by advanced classes, consisting either of researches, or of reviews of careful and elaborate experiments previously worked up by others.

The department of physics is provided with illustrative apparatus for use in the lecture-room, and with an extensive physical laboratory. The collection of instruments embraces acoustic apparatus from R. Koenig, of Paris ; apparatus for heat and molecular physics from J. Salleron, of Paris ; for light, optics, and electricity from Stoehrer, of Leipsic, and Browning and Newton, of London ; pneumatic and electrical apparatus from E. S. Ritchie, of Boston ; and a large number of pieces prepared at the mechanical shops of the University. It includes, also, Browning's electric lamp ; and from Eliot Brothers, and other makers, London, resistance coils, galvanometers, ammeters, and voltmeters for higher researches in electricity.

A large dynamo in the machine shops is connected with the laboratory. A room on the ground floor is especially devoted to instruction in electrical measurements.

FRENCH AND GERMAN.

See *College of Literature and Science.*

THESES.

In all the schools in this College a thesis is required as a condition of graduation. It must be an original composition of suitable length, upon a subject appropriate to the school, and approved by the professor in charge. It must be upon regulation paper; must be illustrated with such photographs, drawings, and sketches as may be needed; and embellished with a title page neatly printed or lettered with India ink or colors. It will be prepared during the latter part of the fourth year, and presented at the close of the course, after which it will be deposited in the library of the University.

CONTRIBUTIONS.

Our friends and students are invited to send us specimens of material and manufactures, and drawings, models, or photographs of machinery, bridges, and other engineering and architectural works. Finished and detailed working drawings, perhaps otherwise useless, may be of great value for instruction. Illustrated circulars and price lists of manufacturing firms are desired. Contributions will be labeled with donors' names, and placed in the museum of industrial arts for the inspection of students and the illustration of lectures.

SCHOOL OF MECHANICAL ENGINEERING.

OBJECT OF THE SCHOOL.

This school seeks to prepare students for the profession of mechanical engineering. It aims to fit them to invent, design, construct, and manage machinery for any branch of manufactures. The state needs men who, to a thorough knowledge of the principles of machinery and of the various motors, add the practical skill necessary to design and construct the machines by which these motors are made to do work.

INSTRUCTION.

The instruction, while severely scientific, is thoroughly practical. It aims at a clear understanding and mastery of all mechanical principles and devices. Practice in the workshop is required as one of the studies of the course.

In *principles* instruction is imparted by lectures, illustrated plates, and text books. Examples are given, showing the application of the theories and principles taught. Ex-

periments in the testing of machines and motors are undertaken by the student.

In *practice* elementary forms are produced and projects are executed, in which the student constructs machines, or parts thereof, of his own designing, and from his own working drawings.

In *designing* the student begins with elements and proceeds with progressive exercises till he is able to design and represent complete machines.

MECHANICAL ART AND DESIGN.

An elementary course of shop practice has been carefully arranged, to familiarize the student with the forms of the parts of machines, and the mode of producing them. He is made familiar with all the ordinary cutting tools for iron or wood; with the form and condition for most effective work; with the machines and appliances by which they are put in action, and the instruments by which desired dimensions of product are obtained. This practice is obtained in the mechanical laboratory, and represents five different shops, viz:

1—Pattern Making.
2—Blacksmithing.
3—Foundry Work.
4—Bench Work for Iron.
5—Machine Tool Work for Iron.

In the 1st, the practice consists in planing, turning, chiseling, etc., in producing true surfaces in various forms in wood, and also in combining pieces by glue joint, etc., preliminary to correct pattern making. Patterns are finally made from which are cast pieces in iron, brass, etc., to be worked in the subsequent shops.

In the 2d, the student uses the forge and performs the various elementary operations, such as drawing, upsetting, bending, welding, etc.

In the 3d, the processes of moulding and casting are fully illustrated.

In the 4th, there is first a course of free-hand bench work, the cold chisel and file being the only tools. After the hand and eye are sufficiently trained, fitting is begun, and the square, bevel, rule, compasses, and other auxiliary bench tools are used. Pieces are then fitted together by the file, with surfaces carefully finished.

In the 5th shop, the ordinary machine tools of the machine shop are used. The first practice employs these machines with their cutting tools or bits, in common operations, such as turning cylinders, discs, grooves, and fillets; boring, drilling, hand-turning, milling, planing, etc. Following this is a course of practice in fitting and finishing, in which calipers, rules, etc., are introduced, and many of the various fittings employed in machinery are produced.

Previous to the shop-work, drawings of the pieces are made by the student, and the exact thing to be done is indicated; thus mistakes are avoided and practice facilitated.

The designing of such machine elements as pulleys, journal boxes, cranks, stuffing boxes, etc., cultivates a knowledge of proportion, and of its proper representation on paper. This course of elementary practice fits the student for the advanced shop practice in designing and construction of complete machines undertaken later in the course.

SPECIAL STUDIES.

Principles of Mechanism.—Relative motion of points in a system of connected pieces; motion independent of force; velocity ratio; investigation of motion of elementary parts of machines, as friction and non-circular wheels in rolling contact, cams and curves in sliding contact; teeth of wheels; spur, bevel, and screw gearing; link-work; quick-return motions; escapements; trains of mechanism; epicyclic trains; straight line motions.

Heat Engines.—The theories of air, gas, and steam engines; discussion of the various types; efficiency; proportions of steam boilers.

Hydraulic Engines and Wind Wheels.—Water-pressure engines; turbines and other water wheels; principles of design and efficiency. Theory of wind wheels; types and methods of governing; applications and comparative economy.

Machine Drawing.—Detailed designs of machines in whole or in part, such as links and valve motions, governors, steam boilers and engines, hydraulic presses, etc., with due consideration of strength, economy of construction, accessibility for repairs, etc.

Mill work and Machinery.—Methods of transmitting power; calculations for shafting, gearing, pulleys, belts,

chains, wire and hemp rope; efficiency of various modes of transmission; best forms for long and short distances.

Dynamo-electric Machinery.—The theory of dynamos and motors; principles of design; discussion of different types; efficiency; methods of governing; electric distribution of power; long distance transmission.

PROJECTS AND PRACTICE.

The shop practice of the first year has already been described. The second-year practice has for its object the production of some model or machine. The students, under the immediate direction of the teachers, carefully determine the dimensions and shapes best suited for the parts of some machine, produce them in neat and accurate working drawings, and make tracings for shop use. No student will commence his advanced shop practice without working drawings. The designs are such as require execution in iron, brass, and wood, for the purpose of giving variety of practice. The student is required to make the patterns and castings, finish the parts, and put them together in accordance with the working drawings and the required standard of workmanship. This acquaints him with the manner in which the mechanical engineer carries his design into execution, and teaches him so to shape, proportion, and dispose the parts of a machine as to secure the greatest economy of construction and durability in use. The practice of the third year includes the careful construction of mechanical movements, strictly in accordance with the theoretical determination of the form of the parts.

The steam engine, large drill press, one engine lathe, the hand lathes, the milling machine, and other machinery now in use, were designed here, and built in the shop by students in the department.

Besides these practical exercises, students of sufficient skill may be employed in such commercial work as is undertaken by the shop.

Experiments and Practical Problems.—Experiments in the testing of prime movers and other machines, are undertaken by the students. They take indicator diagrams from the engines of the mechanical laboratories, analyze them, and by means of the friction brake determine the loss in engine friction. They make evaporative tests of boilers and

determine the percentage of moisture in the steam by the use of the calorimeter.

APPARATUS.

This school is provided with plates and a cabinet of models illustrating mechanical movements and elementary combinations of mechanism. This collection is rapidly increasing by our own manufacture, and by purchase from abroad. It includes many of Riggs's models, and others from the celebrated manufactory of J. Schroeder, of Darmstadt, Germany. About two hundred valuable models from the United States Patent Office are also included in the cabinet.

The state has provided a large mechanical laboratory and workshop, furnished with complete sets of tools, benches, vises, and forges, with flasks for moulding in sand, and cupola for melting iron.

STUDIES.

The studies are given by the year and term in the tabular view of the course. The order there indicated should be closely followed, that the student may avoid interference of his hours of recitation.

MECHANICAL ENGINEERING COURSE.

Required for the Degree of B. S., in School of Mechanical Engineering.

FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; German or French.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; German or French.
3. Advanced Algebra; Free-Hand Drawing; Shop Practice; German or French.

SECOND YEAR.

1. Designing and Construction of Machines; Calculus; German or French.
2. Designing and Construction of Machines; Advanced Analytical Geometry; German or French.
3. Engineering Materials and Construction of Machines; Advanced Calculus; German or French.

THIRD YEAR.

1. Mechanism; Analytical Mechanics; Chemistry.
2. Physics; Resistance of Materials; Chemistry.
3. Physics; Advanced Descriptive Geometry and Hydraulics; Astronomy.

FOURTH YEAR.

1. Heat Engines; Machine Drawing; Mental Science.
2. Hydraulic Engines and Wind Wheels; Machine Drawing; Constitutional History.
3. Dynamo-electric Machinery; Mill Work; Political Economy.

In this course the student will take two years of either French or German, but not one year of each.

SCHOOL OF CIVIL ENGINEERING.

OBJECTS OF THE SCHOOL.

The school is designed to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

INSTRUCTION.

While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The power to acquire information and the ability to use it, is held to be of far greater value than any amount of so-called practical acquirements. The method of instruction consists in coupling the development of intellectual power with the acquisition of information directly useful to the civil engineer in his profession.

The instruction is given by lectures, text books, and reading, to which are added numerous problems and practical exercises, as will serve best to explain principles completely and fix them in mind. Models and instruments are continually used, both in lectures and by the students themselves.

APPARATUS.

For Field Practice.—The school is provided with the instruments necessary for the different branches of engineering field practice, including chains, tapes, compasses, plane tables, stadias, transits, levels, barometers, base rods and comparing apparatus, sextants, engineer's transits arranged for astronomical observation, and solar compass attachments for transit.

A portable altitude and azimuth instrument of the latest and best form, from the celebrated makers, Troughton & Simms, of London, is used for instruction in geodesy and practical astronomy. It is read by micrometer microscopes to single seconds, both of altitude and of azimuth. The astronomical observatory is provided with an equatorial tele-

scope, an astronomical transit, with attachment for zenith telescope work, a chronometer, and a set of meteorological instruments.

To facilitate practice in surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. All possible distances, directions, areas, and elevations are accurately known ; hence the instructor knows beforehand the precise result which the student should obtain. Not a single problem or exercise is given in which there is wanting an absolute check upon the accuracy of the work. This is an incentive to the student and enables the teacher to show him the degree of accuracy attained and also to point out errors.

For the Lecture Room.—The school has numerous models for illustrating its specialties, including models of bridges, roofs, joints, and connections; a large collection of drawings, photographs, and photo-lithographs of bridges, roofs, and engineering structures, numerous railway maps, profiles, etc; maps of government surveys, and plans and specifications. It has access to a complete set of lithographs of the lectures and drawings used in the government polytechnic schools of France. The industrial museum contains a large collection of building materials, of wood, brick, stone, and iron. The testing laboratory has a machine with a capacity of a hundred thousand tons for tension, compression, or bending; also a cement testing machine.

The library is well supplied with the best and latest periodicals and books upon engineering subjects, to which the students have full access.

PRACTICE.

In the fall term of the second year the class solves numerous problems in distances, areas, etc., using the chain, compass, and plane table. During the winter term the students have practice with all the engineering instruments and solve problems with the transit, stadia, level, and sextant. In the spring term the class makes a topographical survey of a locality, using the stadia and plane table as in the United States surveys.

In the fall term of the third year the class executes a project in railroad engineering, which consists of pre-

liminary surveys, location, staking out, drawings, computation of earth work, etc. The preliminary survey consists in an examination of the locality, and in running tangent lines, with leveling and topographical sketching. The location consists in running the line over the route decided upon, with all the necessary measurements and calculations for establishing the grade, setting slope stakes, etc. The drawings include alignment, profile, etc.

In the fall of the fourth year the student has practice with the alt-azimuth instrument in reading horizontal and vertical angles, and in determining latitude; with the astronomical transit in finding time; with the sextant in getting time and latitude; with the aneroid and mercurial barometers in measuring heights, and with the precise level in leveling.

SPECIAL STUDIES.

Astronomy.—Descriptive astronomy is given with a text book. The equatorial telescope is in constant use during favorable weather. Practical astronomy is given by lectures and the use of the alt-azimuth instrument, the astronomical transit, the sextant, and the engineer's transit, adapted to astronomical calculations. The work includes the use and adjustment of instruments, and the determination of time, latitude, longitude, and azimuth.

Bridges.—The instruction in bridges occupies two terms. The first is devoted to the calculations of the strains in the various forms of bridging, by algebraic and graphical methods, consideration being given to weights of bridge and train, and force of wind. The second is devoted to designing trusses, proportioning sections, and working out of details. Each student designs and makes a full set of drawings of a bridge.

Geodesy.—From a text book studies are made upon the instruments, methods, formulas, etc., employed in spirit, barometrical, and trigometrical leveling; the apparatus, methods, etc., used in measuring base lines; the location and construction of stations; the method of measuring the angles and reducing the triangulations; the principles of projecting maps; the means employed in running parallels and meridians.

Land Surveying.—Areas and distances by chain, compass, and plane table; U. S. public land surveys, including

legal points involved in the re-establishment of boundaries; magnetic variation and determination of true meridian.

Masonry Construction.—Requirements and methods of testing stone, brick, cement, and lime; composition, preparation and strength of mortar and concrete; classification, construction, strength, cost of stone and brick masonry; foundations under water; theory of stability; cost, etc., of dams, retaining walls, bridge piers, bridge abutments, culverts, and arches.

Railroad Engineering.—Instruction is given from text book and by field practice. In the former are studied the principles of economic location, particularly the effect of distance, grade, and curve upon operation; the inter-adjustment of grades and curves; also the mathematical theory of curves, turnouts, crossings, and the calculation of earth work. In field work the class makes at least two preliminary surveys and one location of a short line, of which each student is to present a complete set of notes, calculations, maps, etc.

Topography.—Use of stadia, plane table, and level in topographical surveying. Topographical drawing includes sketching, platting field notes, conventional signs, and city and county maps.

Theory of Engineering Instruments.—Examination of workmanship and design; testing instrument maker's adjustments; making engineer's adjustments; determination of areas with transit; inaccessible and air line distances with transit; profiles and practice with level; heights and distances with stadia; measurement of angles with sextant, etc.

COURSE OF STUDY.

The complete course occupies four years. The several subjects included therein are shown in the list below. Each study requires five recitations per week, and should receive daily from three to four hours of the student's time. Some of the class exercises occupy one hour daily, while others require two hours; as a rule the latter require less time for preparation. The order of studies as given by the year and term in the tabular view of the course, should be closely followed to avoid interference in hours of recitation, and because the studies are there given in the order which best meets the preparation of the student.

CIVIL ENGINEERING COURSE.

Required for the degree of B. S., in School of Civil Engineering.

FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; French or German.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; French or German.
3. Advanced Algebra; Free-Hand Drawing; Shop Practice; French or German.

SECOND YEAR.

1. Land Surveying; Calculus; French or German.
2. Surveying and Theory of Instruments; Advanced Analytical Geometry; French or German.
3. Topographical Surveying and Drawing; Advanced Calculus; French or German.

THIRD YEAR.

1. Railroad Engineering; Analytical Mechanics; Chemistry.
2. Resistance of Materials; Chemistry; Physics.
3. Astronomy and Hydraulics; Advanced Descriptive Geometry; Physics.

FOURTH YEAR.

1. Geodesy and Practical Astronomy; Mine Attack; Mental Science.
2. Bridge Analysis; Masonry Construction; Constitutional History.
3. Bridge Construction; Geology; Political Economy.

In this course the student will take two years of either French or German, but not one year of each.

SCHOOL OF MINING ENGINEERING.

OBJECT OF THE SCHOOL.

The school has been established to meet the growing demand of a very important industry for thoroughly trained engineers, fitted to solve the numerous perplexing problems which are constantly arising in all mining work. The subjects of the discovery, opening, economical working and proper ventilation of mines, the prevention of accidents, transportation above and below ground, treatment of products, with many others which fall within the scope of the mining engineer, can be mastered only by a careful study of facts and principles. This is the proper foundation for the practical work of the profession, and it is the aim of this school to present this in the most complete and thorough manner.

INSTRUCTION.

It is important that a broad basis be laid by way of general preparation for the more technical studies here included. Whatever of general culture the student may obtain before entering the University, will not come amiss, and, although the requirement is not made, it is advised that all who can do so should acquire a reading knowledge of French or German before beginning this course.

The course comprises the greater part of the pure and applied mathematics of the course in mechanical and civil engineering. Much time is devoted to chemistry and geology, with the addition of metallurgy and other technical studies peculiar to mining engineering.

Students who are graduated from this school are not supposed to be familiar with all the details of mine management from actual experience, but they will have obtained such a knowledge of the principles underlying all successful practice, and such a familiarity with the science of mining in all its branches, that the art may be acquired with the minimum of practice.

Lectures are given when desirable, but these are to be regarded as supplementary to other modes of instruction which are made to conform as closely as possible to the routine of the engineer in practice. In every detail the student is made to feel that he is dealing with the actual problems which he will meet in his professional work.

Plans, estimates, drawings, reports, and calculations, based upon data obtained in the student's own experience, are constantly required, and no pains is spared to familiarize each member of the class with the duties and responsibilities of every grade, from miner to manager.

COURSE OF STUDIES.

In the first two years the work is similar to that required in the course in civil engineering, but more time is given to chemistry. In the third year geology and mining engineering, with assaying and metallurgy, take the place of special technical studies in the other engineering courses. In the fourth year, with the exception of two terms of prime movers taken with the students in mechanical engineering and some studies of general character, the work is strictly technical.

SPECIAL STUDIES.

Mine Surveying and Reconnoitering.—History, uses and adjustments of instruments; solar compass and various solar attachments; practical problems involving the running of surface lines and lines under ground; connecting of surface and underground surveys; practice of U. S. deputy surveyors. Details of mine surveys, setting of bench marks; lines through shafts, drifts, stopes, etc.; keeping of records, plans, etc. Surveys required to determine best locations for test borings, shafts, adits, etc.; methods of reconnoitering.

Mining Engineering.—*1. Attack.*—Tools, implements, machinery, and explosives, with principles governing their use. Methods of boring, sinking, and driving through hard, soft, wet, dry, loose, or compact material.

2. *Timbering.*—Objects, methods, etc.; framing, fitting, bracing.

3. *Transportation.*—Underground haulage, hoisting, use of chutes; apparatus and appliances, cars, tracks, switches, cables, cages, motive power, connections; haulage in inclines, "man-engines," etc.

4. *Drainage.*—Pumps, pumping, sumps, ditches; drainage of working shafts and inclines.

5. *Ventilation.*—Means and appliances. Importance of subject; laws of various states and countries. Discussion of fundamental principles and practical applications, with results.

6. *Buildings and Machinery.*—Hoisting apparatus, air compressors, power drills, etc.

7. *Exploration.*–To determine general character and extent of deposits in advance of development; methods and aims.

8. *Development.*—Blocking out of deposits to prove values of partly explored ground, and to prepare for further explorations.

Exploitation.—Laying out work; winning of coal, ore, etc.; stoping, overhand and underhand; winzes and intermediate levels; economical handling of product. Methods to be employed under various conditions.

Dislocations.—Faults, upthrows, downthrows, feeders, leaders, rolls, swells, etc. Means of overcoming difficulties.

Dressing of Products.—Coal screening and washing; sampling and grading ore; assorting, crushing, spalling, cobbing, concentrating.

Mining Machinery.—Elements of construction, designing of plant, combination of parts; setting, arranging, adjusting. Preservation and operation, general economy.

Organization.—Economy of management. Secondary superintendence; division of labor and adjustment of responsibility. Prevention of accidents.

Administration.—Review of principles. System of reports from sub-officers, and tabulation of records. Accounts, forms, analyses, pay-rolls, cost sheets, etc. Letting and measuring contracts. Miscellaneous details.

Engineering Geology.—Applications of geology to engineering and mining. Nature and distribution of deposits of economic value, as coal, water, metallic ores, etc.; advanced structural geology and lithology; discussion of principles underlying successful working of mines, placing of foundations, setting of machinery, and erection of structures in various situations. Relation of geological structure to drainage, economy of working, selection of points of attack, methods of exploration, etc.

APPARATUS.

The department has a valuable collection of models of mining and metallurgical machinery.

The newly equipped laboratory now contains a very complete line of illustrative machinery, designed for practical use, and covering a wide range of metallurgical processes. The machines are operated by steam power, and include apparatus for crushing, screening, washing, concentrating, leaching, precipitating, and many other methods of ore treatment of the latest modern types.

In the manipulation of these machines, and the tests made on a working scale, the student is afforded opportunity for practice illustrative of the class-room work. The plant consists of a Dodge ore-crusher, a pair of Cornish rolls, elevator with deflecting spouts, automatic sampler, revolving screens, separators, rotating table, jigs, etc.; chlorine generator, tanks, vats, and troughs, gas and blast furnace, with suitable appliances so arranged that they may be used together or separately as occasion may require.

The extensive apparatus of other departments is equally available for this.

COURSE IN MINING ENGINEERING.

Required for the Degree of B. S., in School of Mining Engineering.

FRESHMAN YEAR.

1. Trigonometry; Projection Drawing; Chemistry; French or German.
2. Analytical Geometry; Descriptive Geometry and Lettering; Chemistry; French or German.
3. Advanced Algebra; Free-Hand Drawing; Chemistry; French or German.

SOPHOMORE YEAR.

1. Land Surveying; Calculus; Chemistry.
2. Theory of Instruments; Advanced Analytical Geometry; Physics.
3. Topographical Surveying; Advanced Calculus; Physics.

JUNIOR YEAR.

1. Mine Attack; Analytical Mechanics; Mineralogy.
2. Geology; Resistance of Materials; Assaying.
3. Geology; Mining Surveying; Metallurgy.

SENIOR YEAR.

1. Mining Engineering; Heat Engines; Mental Science.
2. Engineering Geology; Hydraulic Engines and Wind Wheels; Constitutional History.
3. Mining Engineering; Mine Administration; Political Economy.

SCHOOL OF ARCHITECTURE.

OBJECT OF THE SCHOOL.

The object of this school is to prepare students for the practice of the profession of architecture. A thorough knowledge of scientific principles applied to construction, ability and refined taste in design, a technical acquaintance with the processes of the various building trades, and some skill in the use of tools, are necessary for this, and are made prominent objects of the course of instruction.

The course of study comprises the theory and practice of construction, the history and esthetics of architecture, draughtsmanship, and the usual work of office practice, so far as this can be taught in a professional school. Technical instruction is imparted by recitations from text books, lectures, and especially by the application of principles to practical cases; engravings, photographs, and models are employed as illustrations.

Drawing is practiced during the entire course, and designing is introduced early, so that original work is done whenever possible. Drawing from casts and modeling in

clay give command of the hand, facility in sketching, and a knowledge of beautiful forms.

Shop practice comprises elementary forms and joints in carpentry and joinery, and experience in cabinet-making and turning, as well as the construction of models of architectural structures at a reduced scale.

SPECIAL STUDIES.

Elements of Drawing.—Lectures; designs for specified problems; outline sketches and finished drawings from casts, in pencil, crayon, charcoal, etc.

Water Color Painting.—Practice in elementary landscape painting and sketching from nature in water colors.

Wood Construction.—Materials and tools; frames, floors, roofs, ceilings, domes, heavy frames, roof trusses, stairs, doors, windows, cornices, etc.; external and internal finish.

Stone Construction.—Materials, mortars, and cements; concrete; walls, foundations, arches, and vaults; tools and processes of stone-cutting.

Brick Construction.—Materials, bonds, walls, arches, vaults, centerings, terra cotta, tiles.

Metal Construction.—Manufacture and uses of cast iron, wrought iron, and steel; forms employed in construction; connection by joints, rivets, pins, etc.; columns, lintels, girders, and beams.

Tinner's Work, Slating, Plastering, etc.

Sanitary Construction.—Principles of sanitary science; plumbing, water supply, and sewerage; uses of engineering instruments in surveys for drains, buildings, etc.

Architectural Drawing.—Preparation of a set of drawings as practiced in offices; conventional coloring; drawing the orders; finishing drawings in line, ink, sepia, and color; architectural shades and shadows.

Architectural Perspective.—Study and application of the practical methods explained in Ware's Perspective; original designing in perspective applied to practical problems.

Architectural Designing.—Original sketches and finished designs for specific projects. Several problems are given each term, progressing from simple to complex, Drawings neatly finished in shade and colors.

History of Architecture.—Careful study of the leading historical styles, their derivation, characteristics, construction, applications; most important monuments of each style. Especial prominence is given to those ideas in design which might be useful and suggestive in the development of American architecture.

Esthetics of Architecture.—Study of principles of esthetics as applied to architecture and allied arts; proper treatment of building materials and of the different portions of a building, as well as of its general form; problems requiring original designs.

Estimates.—Methods of measuring builders' work; cost of labor and materials; preparation of estimates for numerous practical examples.

Agreements and Specifications.—Study of principles and examples; preparation of a set of papers for letting contracts for building.

Heating and Ventilation.—Heat, production, losses through walls; flow of air in ducts; obstructions; heating by fireplaces, furnaces, stoves, steam, and hot water. Ventilation, requirements and methods; application to numerous problems.

Graphical Statics.— Elements; equilibrium polygon and its applications; loads and wind pressures on roofs; typical forms of roof trusses; examples; determination of strains in members, sectional dimensions, and details of connections at the joints; construction and use of graphical tables.

SPECIAL EXERCISES.

Specimen plates or tracings are required of each student at the close of each term in drawing or designing, to form a part of his record. These must be made in accordance with the materials and dimensions prescribed, and be finished as directed.

SHOP PRACTICE.

To give a practical knowledge of various kinds of work, three terms are devoted to a course of instruction, which all architectural students are required to pursue, unless they have previously had equivalent practice and obtain credit therefor.

First Term.—Carpentry and Joinery. Planing flat, square, and octagonal prisms and cylinders; framing with

single, double, and oblique tenons; splices, straight and scarfed; mitre, lap, and gained joints; through and lap dovetails; mouldings, mitres, mitre-box, and panels.

Second Term.—Turning and Cabinet-making. Glue-joints; mouldings; inlaying; ornamental veneering; turning cylinders, balusters, ornamental forms, capitals, rosettes, vases, etc.

Third Term.—Construction of portions of buildings or of complete architectural structures at a reduced scale; roof trusses, stairs, frames of wooden buildings, etc., made from drawings.

APPARATUS.

A collection of casts donated by the Spanish government, and another of casts of various architectural details from Lehr, of Berlin, belong to the Schools of Architecture and Design; models of ceilings, roof trusses, stairs and Schroeder's models of joints in wood-work and of constructions in cut stone-work, in the engineering museum.

The School of Architecture possesses a large and rapidly increasing collection of engravings and photographs illustrating the history of architecture and art and their practical applications in all ages. The collection is mounted on about 5,000 cards 11x14 inches, and is classified in two parts, one for the use of the class in history of architecture, the other for use by the various classes in designing; both series are minutely subdivided to facilitate easy reference, and are always open for free use, thus forming a most valuable working library. The plates issued by the most important American architectural journals are to be found here.

The casts, photographs, etc., of the art gallery. In the University Library are many of the best English, German, French, and American architectural works and periodicals.

A large and well-equipped carpenter and cabinet shop, containing cabinet benches and sets of fine tools for class in shop practice; foot and power lathes; machine saws, planer, moulder, tenoner, shaper, jig saw, etc.

The use of the large testing machine, capacity 50 tons.

ARCHITECTURAL COURSE.

Required for the Degree of B. S. in School of Architecture.

FIRST YEAR.

1. Trigonometry; Projection Drawing; Shop Practice; French or German.
2. Analytical Geometry; Descriptive Geometry and Lettering; Shop Practice; French or German.
3. Advanced Algebra; Graphical Statics; Shop Practice; French or German.

SECOND YEAR.

1. Elements of Wood Construction; Calculus; Free-Hand Drawing and Modeling.
2. Elements of Stone, Brick and Metal Construction; Advanced Analytical Geometry; Architectural Drawing and Designing.
3. Elements of Sanitary Construction; Advanced Calculus; Water Color Sketching.

THIRD YEAR.

1. Architectural Drawing; Analytical Mechanics; Chemistry.
2. History of Architecture; Resistance of Materials; Physics.
3. History of Architecture; Advanced Descriptive Geometry; Physics.

FOURTH YEAR.

1. Esthetics of Architecture; Architectural Perspective; History of Civilization.
2. Architectural Designing; Heating and Ventilation; Constitutional History.
3. Architectural Designing; Estimates, Agreements, and Specifications; Political Economy.

BUILDERS' COURSE

The Trustees permit persons desiring to fit themselves for foremen and builders to take a course of a single year, pursuing only the selected studies of the architectural course prescribed in the following course of study.

For admission to the builders' course, students must pass the examinations in English grammar, arithmetic, geography, and U. S. history, but are not required to pass in the studies of the preliminary year, unless they wish to pursue the studies other than those prescribed in the following list. A special fee of $5 per term is charged in addition to the other University fees.

BUILDERS' COURSE OF STUDY.

1. Wood Construction; Projection Drawing; Shop Practice (Carpentry and Joinery).
2. Stone, Brick, and Metal Construction; Architectual Drawing; Shop Practice (Stair Building).
3. Graphical Statics; Architectural Designing; Shop Practice (Cabinet Making).

College of Natural Science.

SCHOOLS.

CHEMISTRY, NATURAL HISTORY.

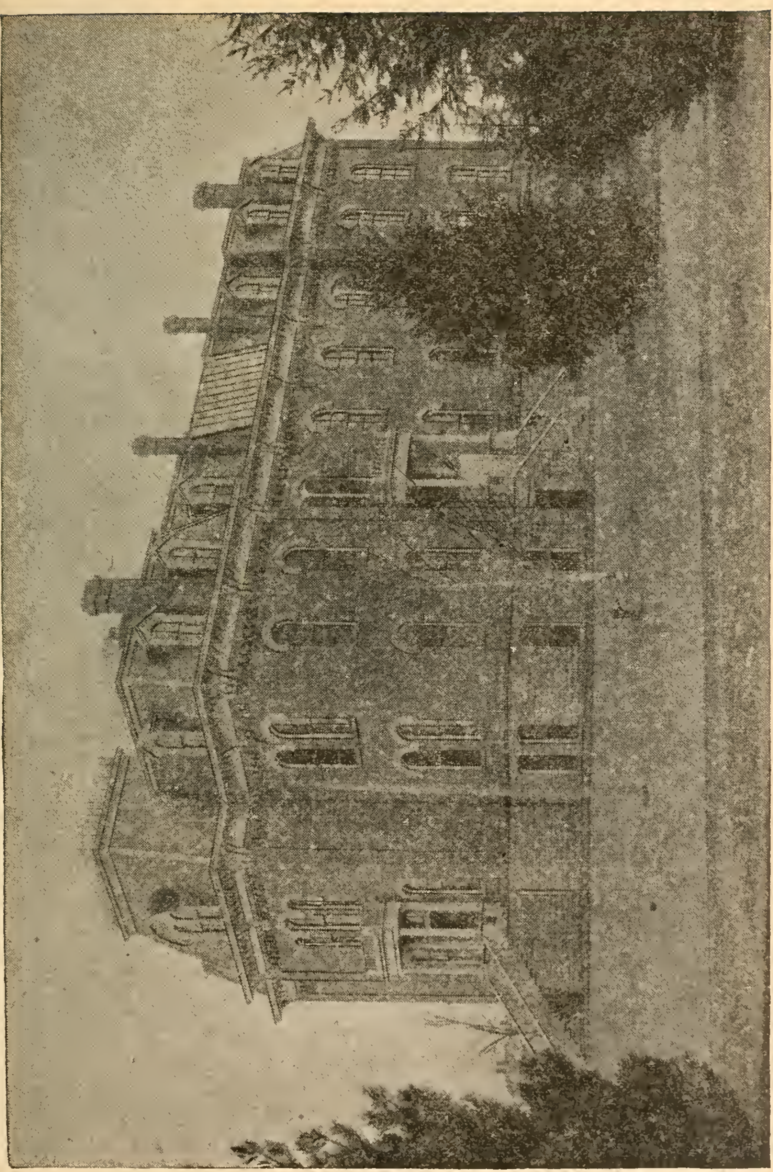
FACULTY AND INSTRUCTORS.

Selim H. Peabody, Ph. D., LL. D., Regent.
Stephen A. Forbes, Ph. D., *Dean*; Zoölogy and Entomology.
Thomas J. Burrill, Ph. D., Botany and Horticulture.
Samuel W. Shattuck, C. E., Mathematics.
Edward Snyder, M. A., Modern Languages.
James D. Crawford, M. A., History.
Peter Roos, Industrial Art.
James H. Brownlee, M. A., Rhetoric and Oratory.
Charles W. Rolfe, M. S., Geology.
Curtis B. Hoppin, Lt. U. S. A., Military Science.
Arthur W. Palmer, Sc. D., Chemistry.
Howard S. Brode, Asst. in Zoölogy.
Charles E. Bogardus, B. S., Asst. in Chemistry.
Harry S. Grindley, B. S., Asst. in Chemistry.
Fanny M. Ryan, Instructor in French.

ADMISSION.

Candidates for the College of Natural Science should be eighteen years of age, and must pass satisfactory examinations in the common school branches, and in the studies of the preliminary year.

Their preparation should be especially good in the scientific studies of the preliminary year. Practice in the drawing of natural objects will greatly facilitate the student's progress. A knowledge of the Latin language is a good preparation for the mastery of the scientific terms which must be learned in the course.



SCHOOL OF CHEMISTRY.

This school aims to impart such knowledge of chemistry as will enable the student to apply the principles of the science to the related arts, and as will fit him for original research, or for the business of the druggist, pharmaceutist, and practical chemist.

INSTRUCTION.

The first term of the first year is occupied by text-book instruction, lectures, and experiments in the laboratory illustrating the elementary principles of chemistry, chemical physics, and inorganic chemistry. The second term is devoted to laboratory practice in qualitative analysis. In the third term recitations upon organic chemistry and illustrative synthetic experiments alternate with laboratory practice in qualitative analysis. During the next three years, besides the required recitations, each student is expected to work two hours daily in the laboratory. Before graduation, each is required, at the end of his course, to make an original investigation, and present a thesis.

Students who pursue chemistry as a part of other courses work at least two consecutive hours daily, during such time as their specialties may require.

Deposits.—At the beginning of each term of laboratory practice, each student will deposit twelve dollars with the business agent of the University. At the end of the term, the balance left, after deducting payment for gas, chemicals and apparatus used, will be refunded.

Five courses of laboratory work have been arranged, as follows:

CHEMICAL COURSE.

FIRST YEAR.

First Term.—General, theoretical, and applied chemistry. Lectures, text book, and illustrative experiments in the laboratory.

Second Term.—Qualitative analysis. Test and separation of the bases and acids. Examination of simple substances.

Third Term.—Qualitative analysis completed. Examination of natural and artificial substances. Organic chemistry. Text book and recitations, with illustrative synthetic experiments in the laboratory.

SECOND YEAR.

First Term.—Quantitative analysis. Class room and laboratory exercises. Gravimetric analysis of salts of known composition; sodium chloride, sodium phosphate, copper sulphate, calcite, ammonium ferric sulphate. Volumetric analysis; acidimetry and alkalimetry, etc.

Second Term.—Quantitative analysis of compounds of unknown composition. Limestone, clay, feldspar, iron ore. Lectures in agricultural chemistry begun.

Third Term.—Examination of agricultural products. Analysis of soil. Valuation of commercial fertilizers—phosphates, nitrogenous matters, and potash salts. Analysis of fodders, grains, and milk. Examination of alcoholic liquors.

THIRD YEAR.

First Term.—Organic chemistry. Principles and practice of organic synthesis. Preparation of carbon compounds, and study of their composition and properties.

Second Term.—Assaying. Dry assays of gold, silver, lead, and tin ores. Valuation of bullion. Blowpipe assays of silver ores. Volumetric assays of ores of silver, lead, copper, zinc, etc. Electrolytic separation of the metals.

Third Term.—Agricultural chemistry completed. Ultimate organic analysis. Determination of carbon, hydrogen, nitrogen, chlorine, phosphorus, and sulphur in carbon compounds. Metallurgy.

FOURTH YEAR.

First Term.—Gas analysis. Calibration of eudiometers. Analysis of air from lungs, atmospheric air, artificial gaseous mixtures, crude coal gas, furnace gases, etc. Analysis of waters, mineral and potable. Chemical theory.

Second Term.—Toxicology. Micro-chemistry of poisons. Tests for mineral and vegetable poisons. Separation from organic mixtures.

Third Term.—Original research. Thesis.

PHARMACEUTICAL COURSE.

FIRST YEAR.

Same as in chemical course throughout the year.

SECOND YEAR.

First Term.—Same as in chemical course.

Second Term.—Quantitative analysis of commercial drugs, bismuth subnitrate, tartar emetic, sodium bicarbonate, potassium iodide, sodium bromide, cream of tartar, ammonium carbonate, potassium nitrate. Volumetric determinations.

Third Term.—Same as in chemical course, substituting materia medica for agricultural chemistry.

THIRD YEAR.

First Term.—Same as in chemical course.

Second Term.—Isolation and quantitative estimation of active proximate principles of vegetable drugs—oils, resins, gums, alkaloids, glucoses, etc.

Third Term.—Practice of pharmacy. Reading and compounding prescriptions. Preparation and valuation of tinctures, extracts, syrups, etc. Examination of commercial organic drugs.

FOURTH YEAR.

First Term.—Analysis of urine, normal and pathological. Examination of waters, mineral and potable. Alcoholic liquors, proprietary articles, etc.

Second Term.—Toxicology. Micro-chemistry of poisons. Separation of poisons from organic mixtures.

Third Term.—Original research. Thesis.

COURSE IN AGRICULTURAL CHEMISTRY.

A. Arranged for students who desire to make a specialty of chemistry in its application to agriculture and allied branches.

FIRST YEAR.

Same as in chemical course.

SECOND YEAR.

First Term.—Same as in chemical course.

Second Term.—Lectures and class work in agricultural chemistry. Analysis of feldspar, soil, ash of plants, drain waters.

Third Term.—Agricultural chemistry. Analysis and valuation of commercial fertilizers, and manures, and material used for manures, apatite, phosphates, guanos, nitrates, ammonia salts, animal matters, and potash salts.

THIRD YEAR.

First Term.—Proximate analysis of farm products and cattle foods; grain. roots, fodders, commercial foods, etc.

Second Term.—Analysis of milk, butter, and cheese. Determination of sugars by polariscope and by titration. Examination of alcoholic liquors.

Third Term —Original research.

B. Arranged especially for regular students in the school of agriculture.

FIRST YEAR.

Same as in chemical course.

SECOND YEAR.

First Term.—Same as in chemical course.

Second Term.—Agricultural chemistry. Lectures and class work. Analysis of feldspar, soil, plant ash, fertilizers and manures, and the materials used in their productions; phosphates, nitrogenous matters, and potash salts.

Third Term.—Agricultural chemistry. Lectures and class work. Analysis of farm products—grains, roots, fodders, commercial foods, milk, butter, and cheese.

METALLURGICAL COURSE.

FIRST YEAR.

First Term.—Same as in chemical course.

Second Term.—Same as in chemical course.

Third Term.—Same as first term, second year chemical course.

SECOND YEAR.

First Term.—Analysis of ores, iron, manganese, zinc, copper, lead, nickel, etc.

Second Term.—Assaying. Same as in chemical course. (Students who pursue this term's work must have one term of mineralogy.)

Third Term.—Analysis of refractory materials, fluxes, and slags.

THIRD YEAR.

First Term.—Gas analysis. Same as in chemical course. Study of furnace gases.

Second Term.—Analysis of fuels—wood, anthracite and bituminous coals, coke; determination of heating power.

Third Term.—Analysis of cast iron, wrought iron, and steel. Determinations of sulphur, silicon, manganese, phosphorus, and the forms of carbon.

The above course has been arranged for students desiring to make a specialty of chemistry in its applications to metallurgy. For students in the School of Mining Engineering the work of the first year described, together with the following, is presented:

SOPHOMORE YEAR.

First Term.—Analysis of ores—iron, zinc, copper. Analysis of crude metals—iron, determination of sulphur, silicon, manganese, phosphorus, and the forms of carbon.

JUNIOR YEAR.

Second Term.—Assaying, same as in chemical course, third term. Metallurgy, with laboratory practice. Analysis of fluxes, slags, fuels, etc.

APPARATUS.

The facilities offered for obtaining a practical knowledge of chemistry are believed to be unsurpassed by those of any other institution in the West. A large laboratory building, 75x120 feet, and four stories in height, has been erected at an expense, including furniture, of $40,000.

The basement contains furnace room for assaying and metallurgical operation; a mill room for storing and crushing ores; and a large room for the manufacture of chemicals and pharmaceutical preparations.

The first story contains a lecture room capable of seating 200 persons, and a qualitative laboratory, which, when completed, will accommodate 152 students; one hundred and four desks are now fitted, each having an evaporating hood, gas, and water. There are a spectroscope table, a blow-pipe table for general use, and a store-room stocked with apparatus and chemicals.

The second story, designed for the use of advanced students, has the following apartments: A lecture room

with mineralogical cabinet, and furnace models for illustrating lectures on metallurgy; laboratory for students in agricultural chemistry; large laboratory for quantitative analysis, now containing sixty-four desks; a balance room, containing chemical balances of the manufacture of Bunge (short beam), Becker & Son, Troemner; a pharmacy, furnished like a drug store, with shelves, drawers, prescription desk, balance, graduates, etc., and containing a full set of drugs and pharmaceutical preparations made in the laboratory by students in pharmacy; private laboratory for instructors; a gas analysis room, entirely cut off from the system of heating and ventilating, to avoid undue fluctuations of temperature, furnished with a table specially constructed, and containing a full set of Bunsen's gasometric apparatus, an inductive coil, battery, mercury, etc.; and a store room with apparatus for all kinds of work in quantitative analysis.

The apparatus for general use includes a large platinum retort for the preparation of hydrofluoric acid; a Geissler's mercurial air pump; Hoffman's apparatus for illustrating the composition of compound gases; a Soliel-Scheibler's saccharimeter; an excellent set of areometers; a Hauy's goniometer; a camera with Ross lenses; a Ruhmkorff's coil; galvanic batteries; a galvanometer; a spectroscope; microscopes; gas combustion furnaces for organic analysis, etc.

On the mansard floor ample provision has been made for the study of photography.

COURSE IN CHEMISTRY.

Required for Degree of B. S., in School of Chemistry.

FIRST YEAR.

1. Chemistry, general and applied; Trigonometry; Free-Hand Drawing; French
2. Chemistry and Laboratory Practice; Conic Sections; Free-Hand Drawing; French.
3. Organic Chemistry and Laboratory Practice; Free-Hand Drawing; Calculus; French.

SECOND YEAR.

1. Chemistry and Laboratory Practice; Physiology or Botany; German.
2. Agricultural Chemistry and Laboratory Practice; Microscopy; German.
3. Agricultural Chemistry and Laboratory Practice; Vegetable Physiology; German.

THIRD YEAR.

1. Laboratory Practice; Mineralogy; German.
2. Laboratory Practice; Physics; German.
3. Laboratory Practice; Physics; German.

FOURTH YEAR.

1. Laboratory Practice; Mental Science; Physiography.
2. Laboratory Practice; Constitutional History; Logic.
3. Laboratory Practice; Political Economy; Geology.

Students who are candidates for the degree of B. S. in the School of Chemistry must perform the laboratory work as laid down in some one of the prescribed chemical courses.

SCHOOL OF NATURAL HISTORY.

The School of Natural History is especially intended to provide a general preparation for the professions and business pursuits requiring more of an acquaintance with the methods and facts of science than with those of literature. More specifically, it is designed:

To afford a thorough and liberal education with a basis in the sciences and modern languages.

To prepare for the teaching of the natural history subjects either in the higher schools or as a professional specialty.

To lay a liberal foundation in biological work and study for a course in medicine.

To prepare for the pursuit of specialties in zoölogy, botany, general biology, and geology, as a scientific career.

The natural history course of four years leads to the degree of bachelor of science. It is distinguished by unusually full instruction in the biological subjects and in the other modern sciences, combined with a thorough course in French and German. It offers two hours a day for a year in botany, and the same each in zoölogy and general or special biology; a term each of entomology, human anatomy and physiology, microscopy, and mineralogy; two terms each of geology and physics; a year of chemistry; a term each of physiography and astronomy; a year each of free-hand drawing and French; five terms each of German and history; one term each of conic sections, trigonometry, political economy, mental science, and logic; and the equivalent of twenty-nine weeks' work, for one hour a day, in practical English composition and oratory.

In zoölogy, botany, general biology, entomology, geology, microscopy, chemistry, and mineralogy, the subjects are developed by a thorough course of laboratory work and practice by the students, done under the guidance and criticism of an instructor, supplemented by lectures and the study of text.

The biological work of the senior year is rendered so far elective in character that it may be made to lead towards the study of medicine, natural history teaching, or the pursuit of a special scientific career.

Special and elective study is permitted and provided for, but does not lead to a degree.

Graduates in literary courses who wish also the advantages of a scientific course, may pursue elective work, or may usually take in two years the degree of bachelor of science by carrying the scientific studies of the course alone.

SPECIAL STUDIES.

Botany.—Candidates for admission are examined upon Gray's Lessons in Botany, or an equivalent, and are expected to be able to analyze common wild flowers. Beginning with the fall term of the sophomore year, systematic and structural botany is continued by recitations, illustrated lectures, and laboratory work upon fresh, dried, and alcoholic specimens. Students, throughout the course, are required to observe for themselves, and to make notes and drawings of their investigations. A series of these drawings, upon a uniform scale, together with the accompanying descriptions, is deposited in the laboratory. Each student provides himself with suitable pencils, drawing pens, paper, needles in handles, glass slides for mounting objects, and a razor for making thin sections.

The first half of the fall term is devoted to the study of the natural orders of flowering plants, their geographical distribution, importance, etc., together with a history of a few special plants and their products. During this time, students analyze in the laboratory flowering plants of the more difficult orders, compositæ, gramineæ, etc., especially such as are best obtained in autumn. During the last half of the term the general morphology of plants, including vegetable anatomy and histology, is studied, practical labor-

atory work with the microscope being the basis of the instruction.

The special morphology of the great divisions of the vegetable kingdom, their chief characteristics, their classifications, and the identification of species of flowerless plants, constitute the work of the second term. Special attention is given to injurious fungi. Aquaria furnish numerous kinds of fresh water algæ, and the greenhouses supply specimens in nearly all the groups studied.

Vegetable Physiology is studied in the third term. The instruction is given by lectures or text-book, and by experimental practice. The work includes: The food of plants and its absorption and assimilation; fluids, their kinds, uses, causes of movement, transpiration, respiration, etc.; processes, peculiarities, and results of growth; relations and effects of temperature, light, gravitation, etc.; self- and cross-fertilization, movements, "sleep of plants," tendrils, climbing vines, etc.

For illustration the school has a collection of about one thousand species of the plants indigenous to the State of Illinois, including a very nearly complete set of the grasses; a collection of Rocky Mountain and western plants; and many others obtained by exchange from various parts of the United States. A collection of fungi contains numerous species. The greenhouses and out-door plantations furnish a large amount of illustrative material for the classes. Enlarged *papier maché* models of flowers and fruits, exhibiting structure and development, are in the cabinet.

Throughout the course the attempt is made to introduce the students to the literature of the various subjects and to acquaint them with the authorities for the facts stated.

Microscopy.—Students have in this study further practice in the use of the compound microscope, the management of light for particular purposes, the testing of lenses, measurement of magnifying powers and angles of aperture, drawing and photographing objects, the preparation and mounting of material, etc. The application is mainly, but not exclusively, devoted to vegetable tissues and products.

The special aim is to afford the opportunity of gaining a skillful and rational use of the instrument, and an acquaintance with the best methods and processes of preparing and

mounting objects. Students provide themselves with slides and covers, needles, forceps, brushes, and razors. Microscopes, section cutters, turn tables, etc., are furnished by the University.

About thirty compound microscopes represent the best American and European makers.

Anatomy and Physiology.—The students admitted to this class have already passed an entrance examination in the elementary principles of anatomy and physiology. They have also had a year's training in zoölogy, which makes a free use of the facts of comparative anatomy possible, and aids greatly in the work of the course.

The main objects of the course are to make the student familiar with the position, structure, and healthy action of those organs most liable to become diseased; to make plain the part which the nervous system plays in both the healthy and morbid action of the various organs, and in the problems of nutrition and energy.

The subject is taught during the fall term of the junior year. The plan embraces lectures, recitations from the text book, frequent readings from standard authors, and demonstrations from fresh dissections, alcoholic specimens, microscopical preparations, skeletons, and the manikin.

Zoölogy.—The object of the zoölogical course is primarily to give the students command of the methods of zoölogical research and study, and to derive from these their distinctive discipline. The subject is taught ten hours a week during the whole of the sophomore year, the course being based throughout on individual work in the zoölogical laboratory, and in the field.

The more important features of the work are comparative dissections, descriptions, drawings, and microscopic preparations of types of the greater groups, as a basis for the study of the sub-kingdoms and their more important divisions; lectures on the comparative physiology of selected forms, with especial reference to their relations to their environment, organic and inorganic, present and past; studies of the zoölogical classification, commonly introduced by analytical synopses, exhibiting the technical relations of groups; lectures and elaborate reviews directed especially to the general system of homologies by which zoölogical science is organized

as a coherent whole; a course of lectures in general embryology, given with principal reference to the descent of animals, and as a preparation for later work in special embryology; and lectures on the history of zoölogical science and its final generalizations.

The *general biology* of the senior year includes comparative histology of animals, and the embryology of the chick; in plants, development and reproduction in the various groups of cryptogams and phanerogams and bacteriology.

The library and collections of the University are supplemented by those of the State Laboratory of Natural History, and of the State Entomologist, to which the students in this department have access.

Entomology.—The study of entomology, pursued during a single term of the freshman year, is necessarily made largely empirical and practical, the subject to which it is principally directed being the place of insects in the general system of organic life; and, incidentally to this, the relations of insects to the interests of man.

The foundation for a knowledge of structural entomology is laid by the discussion and detailed study of a typical insect; and for that of the orders, by a generalization of the characters of selected groups of specimens representing each.

A large part of the time is devoted to the study of the characters, life histories, habits, and economic relations of a selected list of especially important insects. Specimens of these in their different stages, together with synopses and descriptions of the families to which they belong, are furnished the students, and the essential facts, not discoverable by direct observation, are given in lectures or acquired by study of text.

Practice in field observation is given as opportunity offers, and all are taught the ordinary methods of the collection, preparation, and care of specimens, together with the approved methods of controlling the ravages of the injurious species.

A personal study, continuous for the term, of the life, history and habits of some insect species is made by each student and is finally reported in the form of a thesis.

In both field and laboratory work, an extraordinary opportunity is offered to competent students of this course to

observe and assist in practical entomological work and original research.

Geology.—The course in geology covers a period of twenty-two weeks, two hours daily. The scheme of instruction comprises: The study of a series of localities in which great surface changes have recently taken place, in order to discover the characteristics of the forces which produced the changes and the tool-marks by which their action in former times may be traced.

The mineral composition of the different kinds of rocks; the changes produced in their composition by the action of underground water; the conditions under which each species was formed and the relation between these conditions, and the structure of the resulting rock; a series of analyses covering most of the varieties of crystalline and sedimentary rocks, and the collection and identification of such erratics as can be obtained from the drift.

A somewhat rapid review of the qualities and distribution of those substances found most useful in the arts, together with the conditions which have produced them.

A study of the sub-divisions of geologic time as laid down in Dana's Manual, with the physical and organic changes which characterize them, and the distribution of the rocks laid down during each period.

An analytical study of the larger groups of fossils, with many of the more common genera and species.

A second course of 11 weeks, 2 hours daily, is offered to students from the chemical, civil engineering, and language courses, in which the entire subject is outlined; detailed study is made of a few of the more important points, and some acquaintance with both rocks and fossils is gained.

A third course, one hour daily for 11 weeks, for students in mining, is devoted entirely to a detailed study of the origin, qualities, and distribution of substances having economic value.

Mineralogy.—Fourteen weeks; about six weeks are occupied in lectures on crystallography; Nauman's system of symbols is used and explained. A collection of models, comprising the most important forms and combinations in the various systems of crystalization, is used for illustration and study. The remainder of the term is occupied by the de-

scriptive determination of minerals, and the use of the blowpipe. The cabinet of minerals contains a valuable and extensive collection of leads of the state, and a very considerable collection of other minerals, American and foreign.

Physiography.—This name is given to the work in a term of the senior year. The purpose is to gather the lines of investigation previously followed in the development of the physical and natural sciences into a consistent whole, culminating in a natural history of the earth and its inhabitants, including anthropology; an account of the past and present distribution of plants and animals; and an explanation of the general phenomena of meteorology and climatology.

COURSE IN SCHOOL OF NATURAL HISTORY.

Required for the Degree of B. S., in School of Natural History.

FIRST YEAR.

1. Chemistry; Free-Hand Drawing; Trigonometry; French.
2. Chemistry; Free-Hand Drawing; Conic Sections; French.
3. Chemistry; Free-Hand Drawing; Economic Entomology; French.

SECOND YEAR.

1. Zoölogy; Botany; German.
2. Zoölogy; Botany; German.
3. Zoölogy; Vegetable Physiology; German.

THIRD YEAR.

1. Anatomy and Physiology; Mineralogy; German; Ancient History (optional, extra).
2. Geology; Physics; German; Mediæval History (optional, extra.)
3. Geology; Physics; Modern History.

FOURTH YEAR.

1. Physiography or Biology; History of Civilization; Mental Science.
2. Microscopy or Biology; Constitutional History; Logic.
3. Biology; Astronomy; Political Economy.

In this course three terms of University Latin will be accepted in lieu of the three terms of French; and five terms of such Latin for the five terms of German.

COLLEGE OF LITERATURE AND SCIENCE

SCHOOLS.

ENGLISH AND MODERN LANGUAGES.

ANCIENT LANGUAGES.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, PH. D., LL. D., REGENT.
EDWARD SNYDER, M. A., *Dean;* Modern Languages.
THOMAS J. BURRILL, PH. D., Botany.
SAMUEL W. SHATTUCK, C. E., Mathematics.
JAMES D. CRAWFORD, M. A., History and Ancient Languages.
PETER ROOS, Industrial Art.
STEPHEN A. FORBES, PH. D., Zoölogy and Entomology.
JAMES H. BROWNLEE, M. A., Rhetoric and Oratory.
CHARLES W. ROLFE, M. S., Geology.
NATHANIEL BUTLER, JR., M. A., English Language and Literature.
CURTIS B. HOPPIN, LT. U. S. A., Military Science.
S. ROBERTSON WINCHELL, M. A., Latin.
ARTHUR W. PALMER, SC. D., Chemistry.
FANNY M. RYAN, Modern Languages.

ADMISSION.

Candidates for the School of English and Modern Languages will be examined in algebra, geometry, natural philosphy, physiology and botany, and Latin but not Greek.

Candidates for the School of Ancient Languages will be examined in Greek, but not in Botany, Physiology or Natural Philosophy.

Students desiring to enter the College of Literature and Science must pass the examinations in preparatory Latin before they can be matriculated.

OBJECT OF THE SCHOOLS.

The object of the schools in this college is to furnish a sound and liberal education to fit students for the general duties of life, and especially to prepare them for those business pursuits which require a large measure of literary and scientific knowledge and training. They meet the wants of those who wish to prepare themselves for the labors of the press as editors and publishers, for teachers in the higher institutions, or for the transaction of public business.

INSTRUCTION.

The plan of instruction embraces, besides the ordinary text-book study, lectures and practical exercises in all the departments, including original research, essays, criticism, and other work intended to illustrate the studies pursued, and to exercise the student's own powers.

A prominent aim will be to teach the right use of books, and thus to prepare the students for self-directed investigation and study, which will extend beyond the curriculum of his school and the period of his graduation. With this view, constant use of the already ample and continually enlarging stores of the library will be required and encouraged.

Of special value as an incentive to, and the means of practice in, English composition, should be mentioned THE ILLINI, a semi-monthly paper edited and published by the students of the several colleges, each of which is appropriately represented in its columns. A printing office has been provided in the mechanical building, and a press with a requisite supply of type.

The *Library* is well supplied with works illustrating the several periods of English, American, French, and German literature, as also those of ancient literature. It contains at present over nineteen thousand well selected volumes, and is constantly growing by purchase at home and abroad. Valuable American and foreign periodicals are received regularly in the reading room. (See list on pages 33 and 34.

The following subjects are common to the schools of this college, and may be appropriately described in this place.

MATHEMATICS.

First Term.—Trigonometry, plane and spherical; fundamental relations between the trigonometrical functions of an

angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications.

Second Term.—Conic sections, geometrical method. Definitions and general properties of the ellipse, hyperbola, and parabola; curvature of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane; of the conic sections.

Third Term.—Differential calculus; the differentiation of functions of a single variable; development of functions. Infinitesimals; order of an infinitesimal; the substitution of one infinitesimal for another; the limit of the ratio of two infinitesimals; the limit of the sum of infinitesimals. Integral calculus; formulas for direct integration and by substitution; integration by parts; simplification by transformation; area of a segment of a circle, of an eclipse, of an hyperbola; length of an arc of a circle, of a parabola, etc.

PHYSICS AND ASTRONOMY.

See College of Engineering, page 44.

NATURAL SCIENCE.

See College of Natural Science, page 66.

HISTORY AND SOCIAL SCIENCE.

The historical studies are designed to afford a general view of the history, social organization, and progress of the race. They embrace also the history of the arts and sciences, and of civilization, the principles of civil polity and law, the philosophy of history, and the principles of political economy and constitutional law.

The course occupies six terms in the junior and senior years of the University course.

JUNIOR YEAR.

History of Greece and Rome, and of other ancient nations; Ancient Geography; Mediæval History; Modern History; European Geography.

SENIOR YEAR.

Constitutional History of England and the United States; History of Civilization; Political Economy.

PHILOSOPHY AND LOGIC

The studies of this department require much maturity of powers and are therefore confined to the senior year.

Mental philosophy. Analysis and classification of mental phenomena; theories of perception, consciousness, imagination, memory, judgment, reason. Mental physiology, or connection of body and mind, healthful condition of thought, growth and decay of mental and moral powers. Philosophy of education, theory of conscience; nature of moral obligation; moral feeling. The right. The good. Practical ethics; duties. Formation of character. Ancient schools of philosophy; modern schools of philosophy. Influence of philosophy on the progress of civilization, and on modern sciences and arts.

Principles of logic; conditions of valid thinking; forms of arguments; fallacies and their classification. Inductive and deductive reasoning; principles and methods of investigation. Practical applications of logic in the construction of arguments, in the detection and answer of fallacies, and the formation of the habits of thinking and common judgment of life.

SCHOOL OF ENGLISH AND MODERN LANGUAGES.

ENGLISH LANGUAGE AND LITERATURE.

Studies of the School.—In the arrangement of the studies the endeavor is to present a thorough and extended drill in grammatical and philological study, and in the authors and history of the English language, affording a training equivalent to the ordinary studies of the classical language. This drill extends through three years of the course.

The first two terms of the first year are given to a general survey of the whole field of British and American literature from the middle of the sixteenth century to the present time. All the representative writers come into notice, and representative specimens from the writings of each are carefully read in class. Moreover, each student is required each term to read an entire work of some classic author, making choice from a prescribed list. Frequent ex-

ercises in writing abstracts, or original compositions on themes assigned, are also required. The study of rhetoric occupies the third term.

During the second year a few of the great masters are studied, their work analyzed, and the shaping forces of their times, with their influences upon succeeding times, are investigated. Lectures are given from time to time on topics relating to the class work. Writing and reading required as in first year.

In the senior year the first term is devoted to Anglo-Saxon (A. D. 500-1200), for which the way has been prepared by the study of both English and German. In the second term the study of middle English (A. D. 1200-1500) is taken up, and during the third term philology is studied. Essays, forensics, and orations are required.

French and German.—The course in modern languages in this school embraces two years of French and two years of German. The chief aim is mastery in translation and composition, constant attention being also given to the etymologies common to these languages and the English; the study is thus made to contribute to the student's knowledge of his own tongue, and to the power of expression in the same.

In the first year the student completes the study of a grammar and reader, acquiring a knowledge of the technicalities of the idiom, with a vocabulary sufficient for the use of books of reference in his course. The second year is devoted to a course of select reading and composition, involving a critical study of the languages and their literature.

French and German are used in the class room as a means of conversation, as far as practicable, but this is made subordinate to the main purpose, which is to enable the student to read the languages with ease, rather than to speak them indifferently.

COURSE IN SCHOOL OF ENGLISH AND MODERN LANGUAGES

Required for Degree of B. L.

FIRST YEAR.

1. American Authors or Cicero de Amicitia; French; Trigonometry.
2. British Authors or Livy; French; Conic Sections.
3. Rhetoric or Horace; French; Calculus or Free-Hand Drawing.

SECOND YEAR.

1. English Classics; German; Physiology or Botany.
2. English Classics; German; Zoölogy or Botany.
3. English Classics; German; Astronomy.

THIRD YEAR.

1. German; Chemistry; Ancient History; French (optional).
2. German; Physics; Mediæval History; French (optional)
3. German; Physics or Chemistry; Modern History; French (optional).

FOURTH YEAR.

1. Anglo-Saxon; Mental Science; History of Civilization.
2. Early English; Logic; Constitutional History.
3. Philology; Political Economy; Geology.

SCHOOL OF ANCIENT LANGUAGES AND LITERATURE.

Instruction in the School of Ancient Languages and Literature, while aiming to impart a sufficiently full and critical knowledge of the Latin and Greek languages and writings, makes the study of these tongues subservient, in a more than usual degree, to a critical and correct use of the English. With this view, written translations, carefully prepared, with due attention to differences, equivalences, and substitutions of idioms, and the comparison and discrimination of synonyms, form a part of the entire course.

The study of Latin and Greek composition is continued through the first year, and, to some extent, through the course. Essays, historical and critical, are required from time to time, in connection with the works read, and a free use of the library is urged. It is intended that each student who completes the course in ancient languages shall have a clear knowledge of the history of Greek and Latin literature, and of the principal authors in both languages. As an aid to the appreciation of the literature of the two peoples, Greek and Roman history form an important part of the course, and are taken up in the beginning, illustrating the works read. In the first term of the third year ancient history is taken up as a separate study, and especial attention is then given to the history of Greece and Rome, and the nations with whom they came in contact. Classes will be formed for students who wish to carry their classical study

further than the prescribed course, and every assistance will be given them.

COURSE IN SCHOOL OF ANCIENT LANGUAGES.

Required for Degree of B. A.

FIRST YEAR.

1. Cicero de Amicitia; Iliad; Trigonometry.
2. Livy; Odyssey; Conic Sections.
3. Odes of Horace; Memorabilia; Calculus.

SECOND YEAR.

1. Satires of Horace; Thucydides or German; Physiology.
2. Tusculan Disputations or Terence; Sophocles or German; Zoölogy.
3. Tacitus; Demosthenes or German; Astronomy.

THIRD YEAR.

1. Juvenal or French; Chemistry; Ancient History.
2. Quintilian or French; Physics; Mediæval History.
3. De Officiis or French; Physics; Modern History.

FOURTH YEAR.

1. Mental Science; History of Civilization; Physiography.
2. Logic; Consitutional History; Early English.
3. Political Economy; Philology; Geology.

DEPARTMENT OF RHETORIC AND ORATORY.

All students are required to participate in the exercises of this department. Such a course of instruction in composition and oratory is provided as makes it probable that all who complete it faithfully will be able to express their thoughts, both with voice and pen, in a clear, intelligent manner, and without affectation or embarrassment.

With the exception of one term of the freshman year, which is devoted to the text book of rhetoric, the required theme work extends over the first two years of the course, the remaining two being given to the art of oratory, including the principles of delivery.

The number of themes from freshmen is eight, and from sophomores twelve, and each paper, after correction, is returned to the student to be re-written. For composition the classes are divided into sections of about twenty, which meet weekly. At these meetings, questions of students are answered, the faults and merits of the essays of the preceding week are pointed out, and subjects assigned for the next week. One lecture each term is given by the professor to

the whole class, on the kind of writing involved in the next twelve weeks; as, narration, description, argument, etc.

In oratory, the classes are also divided into sections. A critical analysis is made of some of the master-pieces of the great orators of England and America. The life and character of the orator, the circumstances that called forth the oration, his object in pronouncing it, are considered, and a study is made of his diction, sentences, paragraphs, figures of speech, etc. In addition, selections from the oration are assigned to the members of the class, which, after being well committed to memory, are carefully prepared, under the supervision of the instructor, for delivery in the presence of the whole class. Each member of the junior class is required to write an oration and hand it to the committee of the Faculty having supervision of the annual junior exhibition. From the whole number the committee selects ten, upon the basis of merit, to be presented at the exhibition.

Each member of the senior class is required to prepare a suitable oration or essay and to deliver it before the Faculty and students in the chapel.

Additional Schools.

NOT INCLUDED IN THE FOUR COLLEGES.

SCHOOL OF MILITARY SCIENCE.

Professor Curtis B. Hoppin,

1st Lieutenant 2nd Cavalry, U. S. A.

By the law of Congress, and of the State, the University is required to teach military tactics to its students. All able-bodied male students of the preparatory year and of college classes of the first, second, and third years are enrolled in the companies of the University battalion, and receive instruction in the following military exercises:

School of the Soldier; Manual of Arms.
School of the Company; Movements by Platoons, Firings, etc.
School of the Battalion; Ployment and Deployment of close Columns.
Battalion and Company Skirmish Drill; Bugle Calls.
Bayonet Fencing; Target Practice.
Guard and Picket Duties of Sentinels.

CLASS IN MILITARY SCIENCE.

Classes are taught in military science and tactics, as far as is requisite for officers of the line. At the end of the junior year each member of the class is required to present an essay upon some military subject. This is retained in the library of the department. From these classes are selected the officers of the several companies, for which they act as instructors. The military instruction is under the charge of Lieut. Curtis B. Hoppin, a graduate of the U. S. Military Academy, and an officer of the regular army of the United States. A full supply of arms and ammunition is furnished by the war department, including 300 cadet rifles and accoutrements, and two pieces of field artillery. Ammunition is furnished for practice and target firing, and for artillery use.

No student is eligible to the military class until he has reached the third term of the freshman year, nor unless he is in good standing in all his studies. The course of instruc-

tion is confined strictly to two years. No student will be permitted to retain a command who does not maintain a good standing in conduct and scholarship.

The instruction and class exercises occupy about three hours each week, arranged, as far as possible, so as not to interfere with any other course of study. Students must be careful, however, to ascertain, before entering the military class, that the proper studies and exercises of their chosen course will not be interfered with.

Commissions.—The Governor of the state is accustomed to commission as captains, by brevet, in the state militia, such graduates of the University as have completed the studies of the military classes and have obtained the requisite experience in command in the University battalion. In order to obtain the commission the student must be approved by the Faculty and pass, satisfactorily, an examination in military science and tactics before a committee appointed by the Faculty of the University. It is expected that in order to get the required experience in command, the members of the military class of the third or junior year will serve as commissioned officers of the several companies of the battalion.

The standings obtained in military science are not counted in the number required for graduation or class standing; the commissions above named being deemed sufficient reward for proficiency in this department.

University Uniform.—Under the authority of the acts of incorporation, the trustees have prescribed that all male students, after the first term of their attendance, shall wear the University uniform. The University cap is to be worn from the first. The uniform consists of a suit and a cap of cadet gray cloth. Students can procure them ready made on their arrival here. The University cap is ornamented in front with the initials, U. of I., surrounded by a wreath. Students will always wear their uniforms on parade, but in their rooms and at recitation may wear other clothing.

The University library contains many books on military science, military history and engineering.

Gymnasium.—The drill hall is furnished with a full set of gymnastic apparatus, and classes in gymnastic exercises are organized in the fall and winter terms, under careful leaders. Fee, 50 cents.

The University Cornet Band is composed of students who, while members of the band, are excused from drill. Instruments and music are furnished by the University, and the band plays at drill and other college exercises.

COURSE IN SCHOOL OF MILITARY SCIENCE.

FIRST YEAR.

1. School of the Soldier and Company; Bayonet Fencing.

SECOND YEAR.

1. School of Battalion; Skirmish Drill.
2. Ceremonies and Reviews; Military Signaling; Sword Fencing.
3. Guard, Outpost, and Picket Duty; Military Signaling; Sword Fencing.

THIRD YEAR.

1. Military Administration; Reports and Returns; Theory of Fire Arms; Target Practice; Artillery Drill.
2. Organization of Armies; Art of War; Field Fortifications; Artillery Drill.

SCHOOL OF ART AND DESIGN.

PROFESSOR PETER ROOS.

This school is to subserve a two-fold purpose. 1. It affords to the students of the several colleges the opportunity to acquire such a knowledge of free-hand drawing as their chosen courses may require. 2. It offers to such as have a talent or taste for art the best facilities for pursuing studies in industrial designing or other branches of fine art. Schools of design, in Europe and in this country, have been found important aids to the higher manufactures, adding to the beauty of fabrics, and to the skill and taste of workmen.

The increased interest in the decorative arts, and in the manufactures which they require, has added new importance to the study of drawing and designing. It is the purpose to keep this school of design abreast with the best movements in this direction.

COURSE IN INSTRUCTION.

FIRST YEAR.

1. Form analysis and Construction; Elementary Perspective; Combination Drawing.
2. Shading from Objects; Science of Perspective; Clay Modeling.
3. Drawing from casts; Tinted Designs; Modeling of Ornaments.

SECOND YEAR.

1. Historic Styles of Ornament; Science of Color; Mould making and Casting in Plaster.
2. Monochrome Painting; Designs from Plants; Modeling from Shaded Examples.
3. Constructive Designs; Water Color Drawing; Modeling from Nature.

Students having passed the above course may enter either of the following courses:

COURSE IN DESIGNING.

THIRD YEAR.

1. Decoration in Historic Styles; Drawing of Common Objects; Modeling.
2. Designs for specified Material; Study of Drapery; Art Anatomy.
3. Designs for Furniture; Water Color Drawing; Art Anatomy.

FOURTH YEAR.

1. Tempera Painting; Designs for Monuments; Modeling.
2. Drawing from Life; Designs for Memorial Windows; Modeling.
3. Ecclesiastic Decoration; Emblems and Still Life in Tempera Color; Modeling or Oil Painting.

COURSE IN PAINTING.

THIRD YEAR.

1. Drawing from Statuary; Water Color Painting; Art Anatomy.
2. Imitation of Various Stuffs and Materials; Drawing from Life.
3. Painting from Groups; Sketches from Nature; Art Anatomy.

FOURTH YEAR

1. Drawing from Life; Composition; Painting of Still Life.
2. Painting from Life; Pictures from Description.
3. Painting from Nature; Illustration of Prescribed Subjects.

As a preparation for entering the course in art and design, the study of plane geometry and projection drawing is recommended.

Topics for reading upon art subjects are given weekly.

Detailed studies and sketches, such as are necessary to the successful rendering of things, will be required outside of the regular exercises.

For admission to the advanced classes the student must show proficiency in preliminary work.

The authorities of the University have provided that persons not connected with the institution may join the drawing and painting classes on very moderate terms.

MUSIC.

CLARA MAUD KIMBALL.

Music constitutes no part of any University course of studies, and is therefore not provided by the Trustees. But, as many students desire instruction in music, competent teachers are selected by the Trustees, and rooms are set apart for instruction.

TUITION.

Instruction, term of ten weeks—2 lessons a week....	$10.00
For term of ten weeks—one lesson a week.........	6.00
Practice on piano, one hour daily, per term.........	2.00

The teacher of Vocal Music and Voice Culture, follows the Italian method, giving individual instruction.

TERMS.

Ten weeks—two lessons a week..................	$12.00
Ten weeks—one lesson a week....................	7.00

No deduction on account of absence in either course, except in case of protracted illness.

Special students in music will also be charged the regular term fee charged other students of the University.

PREPARATORY CLASSES.

To meet an urgent demand, the Trustees have temporarily provided for teaching the preparatory studies lying between the work of many of the common schools and the University. Candidates for these classes must not be less than fifteen years old. They must pass satisfactory examinations in arithmetic, geography, English grammar, and history of the United States.

Students in the preparatory studies are not matriculated as members of the University. They pay no entrance fee, but are charged a tuition fee of five dollars a term, and the incidental fee of seven and a half dollars a term. They have all the privileges of the library, and of the public lectures, and are required to drill.

The studies taught in the preliminary year are as follows:

FOR COLLEGES OF AGRICULTURE, ENGINEERING, AND NATURAL SCIENCE.

First Term.—Algebra—(Wells'). Fundamental rules; factoring; common divisors and multiples; powers and roots;

calculus of radicals; simple equations; proportion and progression. *Physiology.*—(Cutter's.) *Natural Philosophy.*—(Norton's.)

Second Term.—*Algebra.*—Quadratic equations, etc. *Geometry.*—(Wells's) Plane geometry, lines, circumferences, angles, polygons, as far as equality. *English.*—Elements of composition. (Clark's.) Orthoepy and word analysis. (Introduction to Webster's Academic Dictionary.)

Third Term.—*Geometry* completed, including solid geometry and the sphere. *English*, as in the second term, with addition of Goldsmith's Traveler and Deserted Village, read for analysis. *Botany.*—Gray's Lessons and Manual.

FOR SCHOOL OF ENGLISH AND MODERN LANGUAGES.

First Term.—*Algebra*, as above. *Physiology. Natural Philosophy. Latin.*—Cicero's Orations. Prose Composition.

Second Term.—*Algebra and Geometry*, as above. *Latin.*—Æneid. Prose Composition.

Third Term.—*Geometry*, as above. *Botany. Latin*—Æneid. Prose Composition.

FOR SCHOOL OF ANCIENT LANGUAGES.

First Term.—*Algebra*, as above. *Latin.*—Cicero's Orations. Prose Composition. *Greek.*—Grammar and Reader.

Second Term.—*Algebra and Geometry*, as above given. *Latin.*—Æneid. Prose Composition. *Greek.*—Anabasis. Prose Composition.

Third Term.—*Geometry* completed. *Latin.*—Æneid. Prose Composition. *Greek.*—Anabasis. Prose Composition.

SOCIETIES.

The Literary Societies have from the opening of the University enjoyed its fostering care.

The ADELPHIC and PHILOMANTHEAN societies for men, and the ALETHENAI for women, occupy spacious halls, which the members have furnished and decorated with taste and elegance. Meetings are held on Friday evenings throughout term time, are well attended, and are maintained with unflagging interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

The YOUNG MEN'S and YOUNG WOMEN'S CHRISTIAN ASSOCIATIONS are active and useful.

Special organizations unite the students of NATURAL HISTORY, of CIVIL ENGINEERING, of MECHANICAL ENGINEERING, of ARCHITECTURE, of AGRICULTURE, and of CHEMISTRY.

REGULATIONS AND ADMINISTRATION

ADMISSION.

Examinations of candidates for admission to the University, or to any of its departments, are held at the University itself, on the two days previous to the opening of each term.

Applicants must be at least fifteen years of age, must pass the required examinations, and must pay the prescribed fees. No distinction is made in regard to sex, nativity, color, or place of residence. Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is very much better to begin upon the first collegiate day in September, when a large number of the classes are organized, several of them to continue during the year. Entrance, however, may usually be made satisfactorily at the beginning of the winter and spring terms.

Entrance Examinations.—The subjects upon which examinations for admission are held are as enumerated below:

For the Colleges of Agriculture, Engineering and Natural Science.

Arithmetic; English Grammar; Geography; History of the United States; Algebra, including equations of the second degree and the calculus of radical quantities; Geometry, plane and solid; Physiology; Botany; Natural Philosophy; Rhetoric and Composition.

The text books mentioned in course of study for the preparatory classes, page 91, may be taken as an indication of the requirements in these studies. Any real equivalents for the books named are accepted.

For the School of English and Modern Languages, the same as the above, except the Rhetoric and Composition and with the addition of the following Latin:

Four books of Cæsar's Commentaries, six orations of Cicero, six books of Vergil's Æneid, with scansion of hexameter verse and the translation of English sentences into Latin prose, based on the portions of Cæsar and Cicero named above. This will necessitate a thorough knowledge of the etymology and syntax of Latin grammar.

Harkness's or Allen and Greenough's grammar and Winchell's (Bingham's) Latin Prose Composition are recommended.

Real equivalents for any of the above mentioned works will be accepted.

The Roman method of pronunciation is recommended.

For the School of Ancient Languages the same as the first list, except the omission of Rhetoric and Composition, Physiology, Botany, and Natural Philosophy, and with the addition of the Latin described and Greek as follows:

Greek Grammar (Goodwin's or Hadley's), Greek Prose Composition (Jones's), and four books of Xenophon's Anabasis. Writing Greek with the accents will be required.

The so-called Continental sounds of the vowels and diphthongs and pronunciation according to accent are recommended.

County Superintendents' Certificates.—To prevent loss to those who are not prepared to enter the University, but might come, hoping to pass the examinations for admission, the following arrangement has been made:

County superintendents of schools will be furnished with questions and instructions for the examination of candidates in the four common branches, Arithmetic, Geography, English Grammar, and History of the United States; applicants who pass creditably will, when they present the superintendent's certificate to that effect, be admitted to the classes of the preliminary year.

Persons who hold teacher's certificates from county superintendents will be admitted to the preliminary class without further examination.

Honorary Scholarships.—Provision has been made for one honorary scholarship for each county in the state. The holder of the scholarship may attend the University for four years, under proper regulations, free of charge for tuition or incidental expenses. The total value of this scholarship is $90.

Several of these scholarships are already occupied. The vacancies in other counties will be filled as follows:

Examinations are to be held in the several counties, under the supervision of the county superintendents thereof, on the first Friday and Saturday of June, at such places as the superintendents may select. Candidates for the examination must be approved by the superintendents in the common English branches. Questions will be furnished from the University, and the answers, in writing, will be sent to the University for judgment. The scholarship will be

awarded to the candidate who passes the best examination, provided he has a standing in each subject not less than 75, and an average standing on all the subjects not less than 80 per cent.

Each pupil who enters the examination may choose whether he will be examined to enter upon a technical course in Colleges of Agriculture, Engineering, or Natural Science, or a literary course in the College of Literature and Science.

In the first case the subjects of his examination will be Algebra, Geometry, Physiology, Botany, Natural Philosophy, and English Rhetoric.

In the second case the subjects will be Algebra, Geometry, Botany or Natural Philosophy, four books of Cæsar, six Orations of Cicero, and six books of the Æneid.

The two classes of examinations are intended to be as nearly equivalent as possible, and to conform to the requirements already stated under the head, Examinations for Admission. It is essential that the examinations in the counties be held at the time named above, publicly, and with reasonable notice; requests for special or private examinations can not be considered.

The following persons have received honorary scholarships for the counties named:

CLASS OF 1892.

Name.	County.
*Armstrong, James L.	Douglas.
Bevis, Albon.	Cass.
Forbes, Robert H.	Bureau.
Hart, Ralph W.	Cook.
Snodgrass, William.	Champaign.

CLASS OF 1893.

Bartlett, H. Emmett.	Brown.
Bennett, Sarah.	Coles.
Braucher, Herbert H.	Logan.
Brown, Frank.	Piatt.
Carrick, William.	Jasper.
Dickinson, Richard J.	Woodford.
Earl, Mark A.	Clinton.
Gaston, Hattie J.	McLean.
*Herrick, George I.	DuPage.
Johnson, Harriette A.	Rock Island.
*Strout, Frank A.	LaSalle.
Woodruff, Thomas T.	Adams.
Yeomans, Frances A.	Vermilion.

* Withdrawn—Scholarship now vacant.

Accredited High Schools.—The Faculty, after personal examination, appoints accredited high schools, whose graduates may be admitted to the University without further examination within one year after date of their graduation. These must be schools of first rate character, whose courses of instruction include all the studies required for admission to some one of the colleges of the University. On application, a member of the Faculty is sent to examine the school making application, as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. If the report is favorable, the name of the school is entered in the published list of high schools accredited by the University. The graduates of these schools are admitted to such of the colleges as their studies may have prepared them to enter. The appointment continues as long as the work of the school is found satisfactory. Annual reports are asked from these schools.

The accredited schools whose graduates are admitted to any of the colleges of the University are the public high schools in

Aurora, East.	Evanston.	Oak Park.
Aurora, West.	Freeport.	Ottawa.
Bloomington.	Galena.	Paris.
Cairo.	Hyde Park.	Peoria.
Champaign.	Jacksonville.	Princeton.
Charleston.	Jerseyville.	Rockford.
Chicago, North.	Kewanee.	Rock Island.
Chicago, South.	Lake View.	Springfield.
Chicago, West.	Lincoln.	Streator.
Danville.	Mattoon.	Tuscola.
Decatur.	Mendota.	Urbana.
Dixon.	Moline.	

Also the high school of the Normal University, at Normal.

The accredited schools whose graduates are admitted to the college of engineering, of agriculture, or of natural history are the public high schools in

Camp Point.	Pekin.	Sheldon.
Farmer City.	Peru.	Sterling.
Gibson City.	Pittsfield.	Sycamore.
Kankakee.	Polo.	Warren.
LaSalle.	Robinson.	Washington.
Marengo.	Rochelle.	Watseka.
Monticello.	Rossville.	Waverly.

Also the Chicago Manual Training School.

CHOICE OF STUDIES.

From the outset the University has permitted great freedom in the selection of studies. It is, however, necessarily required: that the student shall be thoroughly prepared to enter and to keep pace with the classes in the chosen studies, and that he shall take these studies in the terms in which they are taught. *Candidates for a degree must take the course of study prescribed for that degree.* But in the Colleges of Agriculture, Natural Science, and Literature and Science other University drawing will be accepted for an equivalent amount of free-hand drawing.

Each student is expected to have three distinct studies, affording three class exercises each day. On special request, the Faculty may allow less or more.

No change in studies may be made after the beginning of a term without permission of the Faculty.

Due care will be taken to prevent, as far as possible, all abuse of the liberty of choice. Students failing to pass satisfactory examinations in their chosen studies will not be permitted to remain and take other studies without a vote of the Faculty.

REQUIRED STUDIES.

To secure the diffusion of the sciences relating to the great industries, the state legislature, in 1873, prescribed that each student should be taught some of those sciences.

The Trustees accordingly require that each student shall take, each term, one study at least from the following list:

Agricultural Chemistry.
Agricultural Engineering and Architecture.
Analytical Mechanics.
Anatomy and Physiology.
Animal Husbandry.
Architectural Drawing and Designing.
Astronomy.
Botany.
Bridges.
Chemistry.
Dynamics.
Electric Machinery.
Elements of Agriculture.
Elements of Horticulture.
Entomology.
Esthetics of Architecture.
Estimates.
Free-Hand Drawing.
Geodesy.
Geology.
Graphical Statics.
Heat Engines.
History of Agriculture.
History of Architecture.
Hydraulic Engines and Wind Wheels.
Hydraulics.
Landscape Gardening.
Logic.
Machine Drawing.
Masonry Construction.
Mathematics.

Mechanism.
Mental Science.
Metallurgy.
Military Science.
Mill Work.
Mine Administration.
Mine Attack.
Mineralogy.
Mining Engineering.
Physics.
Physiography.
Political Economy.
Railroad Engineering.
Resistance of Materials.
Rural Economy.
Sanitary Construction.
Stone, Brick and Metal Construction.
Surveying.
Vegetable Physiology.
Veterinary Science.
Wood Construction.
Zoölogy.

TERM EXAMINATIONS.

Written examinations are held at the close of each term or oftener, and whenever any study has been finally completed. Any student failing to answer correctly 75 per cent. of the questions proposed, loses all credit for that study, and is precluded from proceeding with any other studies without special permission.

A record is kept of each student's term work and standing, and from this his final certificate of graduation is made up.

A statement of the scholarship and conduct of each student will be sent to his parent or guardian as soon as may be after the end of each term.

DEGREES AND CERTIFICATES.

The law provides that, "on recommendation of the Faculty, the Trustees may authorize the Regent, as president of the University, to issue diplomas to such persons as shall have completed satisfactorily the required studies, and sustained the examination therein, conferring such literary and scientific degrees as are usually conferred by Universities for similar or equivalent courses of studies, or such as the Trustees may deem appropriate." *Approved May 11, 1877.*

In accordance with the law, the following system of degrees has been adopted by the University.

1. All studies will remain, as heretofore, free. Each student may choose and pursue such studies as he may desire, subject only to such conditions as to preparation, times of study and number of studies, as may be necessary to secure efficiency in classes and economy in teaching.

2. But students who wish to be candidates for any degree must complete fully the course of studies prescribed for such degree, and must present an accepted thesis.

3. Students not candidates for any degree will be enrolled as special students, and will receive at the close of their attendance, if not less than a year, the certificates provided by law, with statements of work done and credits attained. Credits from other institutions may not be entered upon such certificates. The form of graduation with a "full certificate" will be discontinued after the commencement of 1891.

4. It is designed that the requirements for all the bachelor's degrees shall be, as nearly as possible, equal in amount and value.

5. The Degree of Bachelor of Science, B. S., will be given to those who complete either of the courses of studies in the College of Engineering, Agriculture, or Natural Science. The name of the School will be inserted after the degree.

6. The Degree of Bachelor of Letters, B. L., will be given to those who complete the course of the School of English and Modern Languages.

7. The Degree of Bachelor of Arts, B. A., will be given to those who complete the course in the School of Ancient Languages.

8. The Master's Degrees, M. S., M. L., and M. A., and the equivalent degrees of C. E., M. E., etc., will be given to those only who have pursued a year of prescribed post-graduate studies, and passed examinations thereon, or after a term of three years' successful practice. In either case an accepted thesis will be required.

GENERAL DIRECTIONS TO STUDENTS.

Young men or women desiring a liberal education, and living at a distance from a college or university, are often puzzled to understand precisely what they will be required to know and to do in order to gain admission. To such, these words are addressed:

1. Notice that a college or university (which is properly a collection of colleges) is designed for the higher education only, and not for the study of common branches. None of the common branches, such as arithmetic, geography, English grammar, reading and spelling, are taught in this University. These all must be finished before you come.

2. In order to pursue profitably the true college studies, and to keep pace with the classes, you must be ready to pass a strict examination in the common branches just mentioned, and in certain other preparatory studies, differing with the different colleges of the University. (See pages 93 and 94.)

3. If well prepared only in the common branches above named, you may be admitted, not to the College, but to the preparatory classes, in which you will study the other preparatory studies for admission to college. (See pp. 91–92.) All preparatory studies must be completed before you can be admitted, as a matriculated student, to any college class.

4. All college studies are arranged in regular courses, in which each term's work is designed to prepare for the next. You should enter at the beginning of the college year, in September. If unable to enter at that time, you may enter at any later time by making up the studies already passed over by the class.

5. Enter college with the purpose of going through, and make your course *regular as far as you go.* If obliged to leave before you have finished the course you will have done the best thing for yourself in the meantime; while if you remain, the regular course is in nine cases out of ten the most useful and effective.

Students desiring only a winter's schooling should go to some high school.

LABOR.

Labor is furnished as far as possible to all who desire. It is classified into educational and remunerative labor.

Educational labor is designed as practical instruction, and constitutes a part of the course in several schools. Students are credited with their proficiency in it as in other studies. Nothing is paid for it.

Remunerative labor is prosecuted for its products, and students are paid what their work is worth. The usual rate paid for ordinary farm, garden, and shop labor is *ten cents* per hour. Students of sufficient experience may be allowed to work by the piece or job, and thus by diligence or skill secure more pay.

Some students who have the requisite *skill*, *industry*, *and economy*, pay their entire expenses by their labor; but, in

general, young men cannot count upon doing this at first, without a capital to begin with, either of skill or of money, to serve them till a degree of skill is acquired. As the number of students increases, it is found more and more difficult to furnish the labor needed, and students cannot count certainly upon finding employment.

BOARD.

The University does not furnish board. There is no general provision for boarding, but there is an abundance of suitable private places in Urbana and Champaign within a reasonable distance of the University where students can obtain either table board, or board and rooms with the advantages of the family circle. Boarding clubs are formed at which the cost of meals is about two and a half dollars per week. Some students prepare their own meals, thus considerably reducing expenses.

The Business Agent and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

EXPENSES.

THE TUITION IS FREE in all the University classes.

THE MATRICULATION FEE entitles the student to membership in the University until he completes his studies, and must be paid before he enters.
Amount $10.00

THE TERM FEE for incidental expenses is for each student.................................... 7.50

Each student working in laboratories, or in the draughting or engineering classes, is required to make a deposit varying from 50 cents to $12, to pay for chemicals and apparatus used, and for any breakages or damages.

A fee of $2.50 is charged students working in the mechanical and architectural shops.

ALL BILLS due the University *must be paid before the student can enter classes.*

The following are estimated maximum and minimum annual expenses, exclusive of books and clothing, of a residence of thirty-six weeks at the University.

	Min.	Max.
Term fees	$ 22.50	$ 22.50
Room rent for each student	18.00	48.00
Table board in boarding houses and clubs	90.00	126.00
Fuel and light	10.00	15.00
Washing at 60 cents per dozen	9.00	18.00
Total amount	$149.50	$229.50
Board and room in private houses, per week	4.00	6.00

FEES IN THE PRELIMINARY YEAR, OR IN THE BUILDERS' OR FARMERS' SHORT COURSES.

Tuition per term	$5.00
Incidental fee, per term	7.50

SPECIAL FEES.

For Instrumental Music, for 20 lessons	$10.00
For Painting or Drawing, to special students	10.00
Matriculation fee	10.00
Graduation fee	5.00

CAUTION TO PARENTS—STUDENTS' FUNDS.

The Business Agent will receive on deposit any funds parents may intrust to him to meet the expenses of their sons. *No greater error can be committed than to send boys from home with large amounts of spending money*, without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money. Students have little real need for money, beyond that required for fees, board bills, and books. The attention of parents and guardians is earnestly requested to this matter, and especially in the case of those students who are under twenty years of age.

LEARNING AND LABOR.

CATALOGUE AND CIRCULAR

OF THE

UNIVERSITY OF ILLINOIS

URBANA, CHAMPAIGN COUNTY, ILL.

(POST OFFICE, CHAMPAIGN, ILL.)

1890-91.

PUBLISHED BY THE UNIVERSITY.

1891.

SEPTEMBER.

S	M	T	W	T	F	S
..	..	1	2	3	4	5
6	7	8	9	10	11	12
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OCTOBER.

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NOVEMBER.

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DECEMBER.

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1892.

JANUARY.

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APRIL.

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1892.

MAY.

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JUNE.

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1892.

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HORNSTEIN BROS., PRINTERS, CHICAGO.

THE UNIVERSITY CALENDAR.

1891-92.

FALL TERM—1891.

Sept. 14, Monday	Entrance Examinations begin.
Sept. 16, Wednesday	First Assembly of Students.
Sept. 17, Thursday	Instruction begins.
Nov. 26, Thursday	Thanksgiving Recess.
Nov. 30, Monday	Instruction resumed.
Dec. 21, Monday	Term Examinations begin.
Dec. 23, Wednesday	Term ends.

WINTER TERM—1892.

Jan. 4, Monday	Extrance Examinations.
Jan. 6, Wednesday	Instruction begins.
Jan 11, Monday	Latest dates for announcing Subjects of Theses for Baccalaureate Degrees.
March 21, Monday	Term Examinations begin.
March 23, Wednesday	Term ends.

SPRING TERM—1892.

March 24, Thursday	Instruction begins.
April 15, Friday	Latest day for presenting Conklin Orations.
April 30, Saturday	Latest day for presenting Commencement Theses and Orations.
May 26, Thursday	Senior Examinations begin.
May 30, Monday	Hazleton Prize Drill.
May 31, Tuesday	Competitive Drill.
June 1, Wednesday	Term Examinations begin.
June 5, Sunday	Baccalaureate Address.
June 6, Monday	Class Day.
June 7, Tuesday	Alumni Day. Conklin Prize Orations.
June 8, Wednesday	Twenty-first Annual Commencement.

FALL TERM—1892.

Sept. 12, Monday	Entrance Examinations begin.
Sept. 14, Wednesday	First Assembly of Students.
Sept. 15, Thursday	Instruction begins.
Nov. 24, Thursday	Thanksgiving recess.
Nov. 28, Monday	Instruction resumed.
Dec. 19, Monday	Term Examinations begin.
Dec. 21, Wednesday	Term ends.

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505 John Street, C.

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702 East University Avenue, U.

ELNATHAN KEMPER NELSON, Assistant Chemist.
307 Wright Street, C.

NOTICE.

The Bulletins of the Agricultural Experiment Station will be sent FREE OF CHARGE to any person in the State of Illinois who is engaged in agricultural pursuits, and who will send his name and post office.

Address:

W. L. PILLSBURY, SECRETARY,
Agricultural Experiment Station,
CHAMPAIGN, ILL.

UNIVERSITY OF ILLINOIS.

HISTORY.

The University of Illinois had its origin in a movement for the higher education of the industrial classes, begun in Illinois in 1851, and resulting in the congressional grant of lands for this purpose, made to the several states in 1862, and amounting in this state to 480,000 acres. The University was chartered in February, 1867, and opened to students in March, 1868. In addition to the endowment from the land grant, over $400,000 was donated by Champaign county in bonds, buildings and farms. The state also has made large appropriations for fitting up and stocking the farms, for library and apparatus, and for buildings, including the large main building erected in 1872 and 1873, the mechanical building, the chemical laboratory, and a commodious military building finished in 1890. Successive colleges and courses have been added as required, until four colleges, including fourteen distinct courses, have been organized.

The whole number matriculated as students since the opening is 2,620. The number graduated from the several colleges, including the class of 1890, is 644. In 1871 the University was opened for lady students, on the same terms as to gentlemen. In 1874 a fine art gallery was established.

The University has a beautiful and healthful situation on the high grounds between the cities of Champaign and Urbana, within the corporate limits of the latter It is one hundred and twenty-eight miles south from Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railways. The country is a region of beautiful rolling prairies, with large belts of timber along the streams, and is one of the richest farming districts of the state.

BUILDINGS AND GROUNDS.

The land occupied by the University and its several departments embraces about 610 acres, including stock farm, experimental farm, orchards, forest plantation, arboretum, ornamental grounds, and military parade grounds.

The main University building, designed wholly for public uses, occupies three sides of a quadrangle, measuring 214 feet in front and 122

feet upon the wings. The library wing contains in spacious halls the museum of natural history, the library, the art gallery, and the museum of industrial art. The chapel wing contains the chapel, the physical laboratory and lecture room, and rooms occupied by the departments of architecture and of art and design. In the main front are convenient class-rooms, and on the upper floor, elegant halls for literary societies. The building is warmed by steam.

The mechanical building is of brick, 126 feet in length, and 88 feet in width. It contains a boiler-room, a machine shop furnished for practical use with a steam engine and lathes, and other machinery; pattern and finishing shop; testing laboratory; shops for carpentry and cabinet work, furnished with wood-working machinery. The blacksmith shop contains sixteen forges with anvils and tools, and cupola for melting iron.

The chemical building contains five laboratories, and is one of the best and largest in the United States.

A new military building, erected in 1889-90, 100 by 150 feet in one grand hall, gives ample space for company and battalion maneuvers and for large audiences upon special occasions.

There are, in addition, a veterinary hall, a small astronomical observatory, three dwellings, two large barns, and a greenhouse.

MUSEUMS AND COLLECTIONS.

The museum of zoölogy and geology occupies a hall sixty-one by seventy-nine feet, with a gallery on three sides, and is completely finished with wall, table, and alcove cases. It already contains interesting and important collections, equaled at few, if any, of the colleges of the West. They have been specially selected and prepared to illustrate the courses of study in the school of natural history, and to present a synoptical view of the zoölogy of the state.

Zoölogy.—The mounted *mammals* comprise an unusually large and instructive collection of the ruminants of our country, including male and female moose, elk, bison, deer, antelope, etc.; and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents, and good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens.

The collection of mounted *birds* (about five hundred and fifty specimens of three hundred species) includes representatives of all the orders and families of North America, together with a number of characteristic tropical forms. Many of these specimens are excellent examples of ar-

tistic taxidermy. A series of several hundred unmounted skins is available for the practical study of species.

The set of *skeletons* contains examples of all the orders of mammals and birds except proboscidæ, together with typical representatives of the principal groups of reptiles, amphibians and fishes.

The *cold-blooded vetebrates* are also represented by a very useful collection of alcoholic specimens, plaster casts, and mounted skins of the larger species, both terrestrial and marine.

Embryology is illustrated by a set of Ziegler wax models, and several series of slides, sections and other preparations.

Conchology is illustrated by several thousand shells belonging to seventeen hundred species; together with alcoholic specimens of all classes and orders. The collection of Illinois shells is fair, but incomplete.

The *entomological cabinet* contains about three thousand species (principally American) named, labeled, and systematically arranged.

The *lower invertebrates* are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

Geology.—The geological collection comprises many of the largest and most remarkable fossils hitherto discovered in the various geological formations, illustrating the general progress of life in the mollusks, fishes, reptiles, and mammals, from the oldest palæozoic time to the present. A fine set of fossils from Germany, and collections suitably arranged for practical study, from this and other states, illustrate the different formations. There is a good collection of foot-prints from the Connecticut river sand-stones.

Botany.—The herbarium contains about one thousand species of plants indigenous to Illinois, including nearly complete sets of grasses and sedges. There are, besides, many other North American plants and some exotics. A collection of fungi includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees well illustrates the varieties of native wood. The trees and shrubs of Stephenson county, Illinois, are represented by a distinct collection.

Plaster casts represent fruits of many of the leading varieties, as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

Lithology.—This collection embraces the principal kinds of metamorphic and volcanic rocks; examples of stratification in the limestone and

fragmental kinds, with many samples of such rocks as are found most valuable for building purposes.

Mineralogy.—The specimens of minerals show all the groups, and all the important and typical species. All the metals are represented, also many of their most important combinations. Many of the specimens are finely crystalized; these, with a complete set of imported models, fully illustrate crystalography.

Agriculture.—A collection of soils from different portions of Illinois and other states; many varieties of corn, wheat, and other cereals and seeds; specimens illustrating the official state inspection of grains at Chicago, showing the quality of the different grades recognized; models of agricultural inventions; models illustrating modes and materials for drains; casts of ancient plows; engravings, lithographs and photographs of typical animals of noted breeds.

The farms give good illustrations of farm buildings, implements, machinery, modes of culture, and of domestic animals of various classes.

Physics.—The cabinets of the physical laboratory contain a collection of apparatus from the most celebrated European and American makers, illustrating the subjects of mechanics, pneumatics, optics, and electricity.

Ample facilities are afforded to students for performing experiments of precision by which the theories of physical science may be tested and original work may be done.

A five-light Weston dynamo at the machine shop is connected with the physical and chemical laboratories for experimental purposes, and is supplemented by a valuable series of instruments for accurate electrical measurements.

A series of standard weights and measures from the office of the Coast and Geodetic Survey of the United States may be consulted at the physical laboratory.

The Mechanical Laboratory is provided with a steam engine, engine and hand lathes, planer, shapers, milling-machine, drill presses, and the requisite hand tools, benches, vises, anvils, etc., for pattern-shop, blacksmith shop, moulding-room, and bench work. Its cabinets contain several hundred models of elements of mechanism and machines from Schroeder, Riggs, the Patent Office, and from the workshops of the University. Important additions to the equipment of tools and machines have lately been made, including a testing machine of most approved design, having a capacity of 100,000 pounds, and a mercury column for accurate testing of water and steam-gauges, and a variety of other apparatus for laboratory investigations.

Mining Engineering is illustrated by a valuable series of models ob-

tained from Freiburg, illustrating sections of mines, machinery for elevating and breaking ore, with furnaces and machinery for metallurgical processes.

An extensive mining and metallurgical laboratory is in process of arrangement. A considerable portion of the machinery is already in working condition.

ART GALLERY.

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a beautiful hall, 61 by 79 feet, and the large display of art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full-size casts of celebrated statues, including the Laocoön group, the Venus of Milo, etc., forty statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over four hundred pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools. Also a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France. The value of this splendid collection, as a means of education, is shown in the work of the course of drawing and design of the University.

MUSEUM OF INDUSTRIAL ARTS.

A large room is devoted to a museum of practical art, the materials for which are constantly accumulating in the various scientific departments. Prominent among the agricultural specimens here exhibited is an excellent collection of the sub-species and varieties of Indian corn, including the best of their kinds, a considerable collection of small grains and of grasses, a collection of fibers in various states of manufacture, and a series of analyses of grains showing at a glance the elements and proportion of structure. The museum contains full lines of illustrations of the work of the shops; models made at the University or purchased abroad; drawings in all departments; Patent Office models, etc., samples of building materials, natural and artificial; a large collection illustrating the forestry of Illinois, Florida, and California; with whatever may be secured that will teach or illustrate in this most important phase of University work. The elegant exhibit made by the University at the Centennial and Cotton Exposition at New Orleans finds a permanent abode in this apartment.

A notable feature of this collection is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster, and a complete

set of drawings, of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy. The monument was to be of white marble, an elaborate gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter millions of francs. The design was placed by the art committee second on a list of 289 competitors; but both the first and second were set aside for political reasons. Mr. Gay's generous gift occupies the place of honor in the museum of industrial arts.

LIBRARY.

The library, selected with reference to the literary and scientific studies required in the several courses, includes above 20,000 volumes, and additions are made every year.

The large library hall fitted up as a reading room, is open throughout the day for study, reading, and consulting authorities. It is intended that the use of the library shall largely supplement the class-room instruction in all departments. Constant reference is made in classes to works contained in the library, and their study is encouraged or required. The reading room is well provided with American, English, French, and German papers and periodicals, embracing some of the most important publications in science and art.

GEOGRAPHICAL POSITION OF THE UNIVERSITY.

The Observatory has the following position:
Latitude, 40° 6′ 29″.66.
Longitude, west of Washington, 11° 10′ 37″.5. or 44m. 42.5s.
Elevation above sea level, 720 feet.

ORGANIZATION.

The University includes four colleges, and in them are found a variety of distinct courses of instruction, each leading towards some special vocation or profession in life. Courses that are cognate in character are grouped in the same college. Each college is under the supervision of a special faculty.

The following are the colleges and courses:

I. The College of Agriculture:
- Course in Agriculture.
- Junior Course in Agriculture.

II. The College of Engineering:
- Course in Mechanical Engineering.
- Course in Electrical Engineering.
- Course in Civil Engineering.
- Course in Mining Engineering.
- Course in Architecture.

III. The College of Natural Science:
- Course in Chemistry.
- Course in Natural History.

IV. The College of Literature and Science:
- Course in English and Science.
- Course in Latin and Science.
- Course in Ancient Languages.
- Course in Philosophy and Pedagogy.

Additional Courses not distinctly attached to any of the colleges:
- Course in Military Science.
- Course in Art and Design.
- Course in Rhetoric and Oratory.

Vocal and instrumental music are also taught, but not as parts of any regular course.

Preparatory Classes.

To meet an urgent demand, the Trustees have temporarily provided for teaching the preparatory studies lying between the work of the elementary common schools and that of the University.

COLLEGE OF AGRICULTURE.

FACULTY AND INSTRUCTORS.

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EDWARD SNYDER, M.A., Modern Languages.
JAMES D. CRAWFORD, M.A., History.
STEPHEN A. FORBES, PH.D., Zoölogy and Entomology.
JAMES H. BROWNLEE, M.A., Rhetoric and Oratory.
CHARLES W. ROLFE, M.S., Geology.
DONALD MCINTOSH, V.S., Veterinary Science.
NATHANIEL BUTLER, JR., M.A., English Language and Literature.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Industrial Art.
SAMUEL W. PARR, Analytical Chemistry.
ELBRIDGE R. HILLS, LT. U. S. A., Military Science.
GEORGE W. PARKER, Wood-work.

ADMISSION.

Candidates for admission to the College of Agriculture must be at least fifteen years of age, and must pass satisfactory examinations in the common school branches and in the studies of the preliminary year. While by law students may be admitted at fifteen years of age, in general it is much better that they shall be eighteen or twenty. It will be well if candidates shall have pursued other studies besides those required for admission. The better the preparation the more profitable the course.

OBJECT OF THE COLLEGE.

The aim of this college is to educate scientific agriculturists and horticulturists. The frequency with which this aim is misunderstood, demands that it shall be fully explained. Many, who look upon agriculture as consisting merely in the manual work of plowing, planting, cultivating, and harvesting, and in the care of stock, justly ridicule the idea of teaching these arts in a college. The practical farmer who has spent

his life in farm labors, laughs at the notion of sending his son to learn these from a set of scientific professors. But all this implies a gross misunderstanding of the real object of agricultural science. It is not simply to teach *how* to plow, but the reason for plowing at all—to teach the composition and nature of soils, the philosophy of plowing, of manures, and the adaptation of the different soils to different crops and cultures. It is not simply to teach *how* to feed, but to show the composition, action and value of the several kinds of food and the laws of feeding, fattening and healthful growth. In short, it is the aim of the true agricultural college to enable the student to understand thoroughly all that man can know about soils and seeds, plants and animals, and the influences of light, heat and moisture on his fields, his crops, and his stock, so that he may both understand the reason of the processes he uses, and intelligently work for the improvement of those processes. Not "book farming," but a knowedge of the real nature of all true farming, of the great natural laws of the farm and its phenomena—this is the true aim of agricultural education. Agriculture involves a larger number of sciences than any other human employment, and becomes a fit sequence to any collegiate training.

The steady aim of the trustees has been to give the College of Agriculture the largest development practicable, and to meet the full demand for agricultural education, as fast as it shall arise. Agricultural students are especially invited to the University.

Boards of agriculture and agricultural and horticultural associations are invited to co-operate with the University in its efforts to awaken a more general appreciation of the value of education, and to aid those who desire to avail themselves of its facilities for instruction.

INSTRUCTION.

The instruction unites, as far as possible, theory and practice—theory explaining practice and practice illustrating theory. The technical studies are taught mainly by lectures with readings of standard agricultural books and periodicals, and frequent discussions, oral and written, of the principles taught. These are also illustrated by demonstrations and observations in the fields, stables, orchards, gardens, plant-houses, etc.

SPECIAL STUDIES.

Elements of Agriculture.—Outline of the general principles underlying agriculture in its theory and practice, introductory to the technical and scientific studies of the course.

Agricultural Engineering and Architecture.—Arrangement of the farm; its improvement by mechanical means, as drainage and irrigation; its divisions, fences, hedges, etc.; its water supply; the construction of roads; arrangement, planning and construction of farm buildings; the construction, selection, care, and use of farm implements and machinery.

Animal Husbandry.—Principles of breeding and management of our domestic animals; description of all important breeds and varieties, giving their history and adaptations.

Rural Economy.—Relation of agriculture to other industries and to national prosperity; influences which should determine the class of farming to be adopted; comparisons of special and general systems; uniting of manufacturing with farming; culture of the various farm crops—cereals, grasses, etc.; farm accounts.

History of Agriculture.—Progress and present condition in this and in other countries. Influence of climate, civilization, and legislation in advancing or retarding. Agricultural literature and organizations.

Rural Law.—Business law; laws especially affecting agriculture—tenures of real estate; road, fence, drainage laws, etc.

Elements of Horticulture.—The following topics are discussed: Orchard sites; the age of trees to plant; the season to plant; how to plant; what to plant; the management of the soil; pruning and care of trees; gathering and preserving fruit; diseases and injuries; the nursery; ornamental trees and shrubs; flower gardens; vegetable gardens, including propagating beds and houses; the vineyard and small fruits, and timber tree plantation. Students have instruction and practice in grafting, budding, propagation by cuttings, etc. Each student has usually grafted from two hundred to one thousand root-grafts of apples.

Landscape Gardening.—Lectures are given upon the general principles of the art, the history, and the styles, the kinds and uses of trees, shrubs, grasses, and flowers, the introduction and management of water, the construction and laying out of drives and walks, fences, buildings, etc. The class draw first from copy, then, after the actual study of some locality with its environments, design and draw full plans for its improvement, indicating positions of all prominent objects, including the kinds and groups of trees and other plants. These plans, with specifications, are to be deposited in the library of the school. Excursions are made when found practicable, for the study of public and private grounds.

The three following studies constitute a year's work designed for those who wish to prepare themselves for special horticultural pursuits, and may be taken as substitutes for agricultural or veterinary studies:

Floriculture.—The study of the kinds, propagation, growth, and care of flowering and other ornamental plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatments. Insects and diseases, with the remedies, are thoroughly treated, and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice.

Pomology and Forestry.—Much of the first half of the term is spent in the orchards, nurseries, and forests, making observations and collections, and in the laboratory work determining species, varieties, etc. A large collection of apples, pears, grapes, peaches, etc., is made each year, and the chief characteristics of each are pointed out. Practice is had in making drawings and plaster casts. Written descriptions of the fruits are carefully made and compared with those given in the books, and systems of analysis and classification are put to practical tests. Students see and perform the skilled operations usually practiced in the propagation and growth of trees. Various methods of pruning and training, especially of grapes, are discussed in the class-room, and illustrated upon the grounds. Students study the injurious insects and fungi which cause or accompany diseases of trees and fruits, and the methods of preventing or diminishing their ravages. The native forests of the vicinity and of the country at large are studied as a foundation for the lessons upon the influence and value of timber and other trees and their artificial culture. For the latter, the forest tree plantation on the University grounds, and the aboretum, afford practical illustrations.

Plant-Houses and Management.—This study includes gardening and landscape architecture; the methods of construction, heating and ventilation, and general management, so as to secure, under the different circumstances, the best plant growth. The class-room work consists of lectures and architectural designing and drawing. Illustrations and practice are afforded by the plant-houses of the University.

VETERINARY SCIENCE.

This science is taught during the third year. In the first term the anatomy and physiology of the domestic animals are taught by lectures, demonstrations, and dissections. Post-mortems of healthy and diseased animals are made, so that the students may become practically acquainted with the tissues in health and in disease. The second term is devoted to the study of veterinary medicines, their actions and uses, and to lectures on the principles and practice of veterinary science. During the entire year practical instruction is given in clinical work at the

veterinary infirmary, where animals are treated or operated on free of charge, for the instruction of the students. Lectures are given on veterinary sanitary science and the principles and practice of veterinary surgery.

A veterinary hall and stable have been provided and a clinic is held to illustrate the lectures on veterinary science. The department has Dr. Auzoux's celebrated complete model of the horse in 97 pieces, exhibiting 3,000 details of structure; also *papier maché* models of the foot and the teeth of the horse at different ages.

Students desiring to pursue the study of veterinary science further than is laid down in the agricultural course, will find ample facilities for so doing.

LABORATORY WORK.

Experiments and special investigations by each student. A thesis is required embodying the results of original observation and research.

For details as to the study of botany, chemistry, zoölogy, entomology, geology, and meteorology, see statements in *College of Natural Science*.

APPARATUS.

The college has for the illustration of practical agriculture, a stock farm of 400 acres, provided with a large stock-barn fitted up with stables, pens, yards, etc.; also an experiment farm of 180 acres, furnished with all necessary apparatus to illustrate the problems of breeding and feeding. It has fine specimens of neat cattle, Shorthorns, Herefords, Holsteins, and Jerseys, and of Poland-China swine. The Agricultural Experiment Station, recently established as a department of the University, exhibits field experiments in the testing of the different varieties and modes of culture of field crops and in the comparison and treatment of soils. It includes experiments in agriculture and horticulture, under the direction of the professors of agriculture and horticulture, and experiments in feeding animals of different ages and development upon the various kinds of food. In common with similar departments in the several agricultural colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science.

Surveying and drainage are illustrated by field practice with instruments and by models. Agricultural chemistry, in connection with laboratory practice, is pursued in the analysis of soils, fertilizers, foods, etc. The college has fine collections of soils, seeds, plants, implements,

skeletons of domestic animals, charts, and other apparatus, including a large number of models of agricultural machinery.

Upon the grounds devoted to the use of the college there are:

A very large specimen apple orchard, planted in 1869, and originally containing about 1,000 varieties—many varieties of pears, cherries, grapes, and small fruits.

A forest tree plantation, embracing the most useful kinds of timber.

An arboretum, in which all hardy indigenous and exotic trees are planted as fast as they can be secured, and which now contains nearly 100 varieties. The ornamental grounds which surround the University building contain about twenty acres, and are kept in neat and attractive style. These, with all the adjuncts of trees and flowering shrubs, lawns, beds of flowers and foliage plants, walks of different materials and styles of laying out, give illustration to the class-room work in landscape gardening. A greenhouse contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in greenhouse management.

The cabinet contains a series of colored plaster-casts of fruits prepared at the University; models of fruits and flowers by Auzoux, of Paris; collections of seeds of native and exotic plants; of specimens of native and foreign woods; of beneficial and injurious insects and specimens showing their work; numerous dry and alcoholic specimens and preparations, maps, charts, diagrams, drawings, etc.

The college has a supply of compound microscopes and apparatus, and students have opportunity to learn their use, and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungous parasites which cause disease to cultivated crops.

FULL COURSE IN AGRICULTURE,

Leading to the Degree of B. S.

FIRST YEAR.

1. American Authors; Chemistry; Advanced Algebra.
2. British Authors; Chemistry; Trigonometry.
3. Horticulture; Chemistry; Conic Sections.

SECOND YEAR.

1. Chemistry and Laboratory; Physics; Animal Anatomy and Physiology.
2. Chemistry of Agriculture; Physics; Veterinary Science; Veterinary Materia Medica.
3. Chemistry of Agriculture; Physics; Veterinary Science.

THIRD YEAR.

1. Agricultural Engineering and Architecture; Botany; German or French.
2. Animal Husbandry; Botany or Zoölogy; German or French.
3. Economic Entomology; Vegetable Physiology; German or French.

FOURTH YEAR.

1. Mental Science; Geology; History of Civilization.
2. Rural Economy; Geology; Constitutional History or Pedagogy.
3. History of Agriculture and Rural Law; Physiography, or Astronomy, or Pedagogy; Political Economy.

N. B.—Students in Horticulture will take the special branches in horticulture described on pages 20 and 21.

THE JUNIOR COURSE IN AGRICULTURE.

The course heretofore offered as the FARMERS' SHORT COURSE will be discontinued.

In its place will be offered, beginning with the fall term of 1891, a course covering two years, having in each term an agricultural specialty, with other subjects selected from the preparatory and college courses. Students who wish to enter this course must pass good examinations in the English branches usually taught in the common schools, or must present a County Superintendent's certificate of examination equal to that required for a second grade teacher's certificate. Students in this course should not be less than eighteen years of of age. It is confidently hoped that many persons who wish training in agricultural science but cannot give time for a full course will avail themselves of this opportunity.

A special fee of $5.00 per term will be charged in addition to the other University fees.

JUNIOR COURSE IN AGRICULTURE.

FIRST YEAR.

1. Farm Equipment and Management; Natural Philosophy; Algebra.
2. Farm Animals; Zoölogy; Algebra.
3. Orchard and Garden; Botany; Plane Geometry.

SECOND YEAR.

1. Farm Measurements and Drainage; Animal Anatomy; Chemistry.
2. Farm Crops; Veterinary Science; Chemistry; Shop Practice.
3. Farm Law; Veterinary Science; Entomology.

COLLEGE OF ENGINEERING.

COURSES.

MECHANICAL ENGINEERING; ELECTRICAL ENGINEERING; CIVIL ENGINEERING; MINING ENGINEERING; ARCHITECTURE.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, PH.D., LL.D., REGENT.
N. CLIFFORD RICKER, M.ARCH., *Dean*, Architecture.
SAMUEL W. SHATTUCK, C.E., Mathematics.
EDWARD SNYDER, M.A., Modern Languages.
JAMES D. CRAWFORD, M.A., History.
IRA O. BAKER, C.E., Civil Engineering.
JAMES H. BROWNLEE, M.A., Rhetoric and Oratory.
CHARLES W. ROLFE, M.S., Geology.
ARTHUR T. WOODS, M.S., Mechanical Engineering.
ARTHUR N. TALBOT, C.E., Municipal Engineering.
ARTHUR W. PALMER, SC.D., Chemistry.
RUFUS ANDERSON, M.E., Iron Work.
GEORGE W. PARKER, Wood Work.
FRANK F. FREDERICK, Industrial Art and Design.
ELBRIDGE R. HILLS, LT. U. S. A., Military Science.
SAMUEL W. STRATTON, B.S., Physics.
GEORGE W. MYERS, B.S., Mathematics.

ADMISSION.

Applicants should be at least eighteen years of age. None are admitted under fifteen. The requirements for admission embrace the common school branches and the studies of the preliminary year. The examinations in mathematics are especially thorough.

Those who make further preparation than that required before entering can make their course more extensive and profitable. The following suggestions are offered to such as wish to make thorough work:

Either French or German are studied during two years; some preparation in Latin will be of great assistance in these languages. The

engineer and architect should be adepts in the various departments of drawing, and some previous study of this branch will be of great advantage. Faunce's Mechanical Drawing may be used as a text book, and the drawings made on smooth paper, eight by ten inches.

The subjects common to all the courses in the College of Engineering are here described; the topics peculiar to each will be noticed under their specific names.

PURE MATHEMATICS, FIRST YEAR.

Advanced Algebra.—Functions and their notation; series and the theories of limits; imaginary quantities; general theory of equations.

Trigonometry.—Plane and spherical. Fundamental relations between trigonometrical functions of angles or arcs; construction and use of tables; solution of triangles; projection of spherical triangles; angles as functions of sides and sides as functions of angles; general formulas; applications.

Analytical Geometry.—The point and right line in a plane; conic sections, their equations and properties; the tangent and sub-tangent, normal and sub-normal, pole and polar, supplemetary chords, conjugate diameters, etc. Discussion of the general equation of the second degree containing two variables.

PURE MATHEMATICS, SECOND YEAR.

Differential Calculus.—Rules for the differentiation of functions of a single variable; successive differentiation; development of functions; maxima and minima of functions of a single variable; differentials of an arc, plane area, surface and volume of revolution; elementary discussion of higher plane curves; the spirals, logarithmic curve, trochoid, etc.; algebraic curves.

Integral Calculus.—Integration of elementary forms and rational fractions; rectification of plane curves; quadrature of plane areas and surfaces of revolution; cubature of solids of revolution.

Advanced Analytical Geometry.—Loci in space; in point, right line, plane and surfaces of the second order.

Advanced Calculus.—Development of the second state of functions of any number of variables; differential equations; maxima and minima of functions of two or more variables; construction and discussion of curves and surfaces; integration of irrational and transcendental differentials and of differential equations of the higher orders and degree; applications; elements of elliptic integrals.

APPLIED MATHEMATICS.

Analytical Mechanics.—Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems of forces; center of gravity; moment of inertia; rectilinear and curvilinear motion and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy and power; mechanical advantage; friction; application of these principles and methods to the solution of numerous and varied engineering problems.

Resistance of Materials.—Elasticity of materials; stresses and strains; experimental laws; working strength for different materials; resistance of pipes and riveted joints: bending and resisting moment, shear and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion, and shafts; maximum internal stresses in beams; fatigue of metals; working strength for repeated stresses; resilience; reliability of the common theory of flexure as shown by actual experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing.

Hydraulics.—Weight and pressure of water; head; center of pressure, velocity and discharge through orifices, weirs, tubes, pipes, conduits, canals and rivers; measurement of pressure, velocity and discharge; water power.

Projection Drawing.—Use of drafting instruments in the elements of mechanical drawing; geometric constructions; orthographic projection and representation of objects; sections; isometric drawing; cabinet projection and false perspective; use of water colors; conventional signs; drawings finished by line shading and by colors; miscellaneous plans and drawings.

Free Hand Drawing.—Outline sketches; drawing from casts; sketches of machines, etc.

Lettering.—Plain and ornamental alphabets; titles and title pages; round and stump writing.

Descriptive Geometry.—Problems on the point, right line, and plane; single-curved surfaces; double-curved surfaces; development and intersections; shades and shadows; perspective; numerous and varied practical problems requiring the application of these principles and methods.

PHYSICS.

The course of physics embraces the kinds of work following:

1. Recitations, in which a text book is used as a guide.

2. Experiments in the physical laboratory, in which the student uses the instruments in testing the principles taught.

3. Illustrated experiments once each week, in which the more costly apparatus is used before the whole class in such experiments as are difficult to perform, and which are more effective when prepared for an audience.

4. Higher physical experiments by advanced classes, consisting either of researches, or of reviews of careful and elaborate experiments previously worked up by others.

The department of physics is provided with illustrative apparatus for use in the lecture-room, and with an extensive physical laboratory. The collection of instruments embraces acoustic apparatus from R. Koenig, of Paris; apparatus for heat and molecular physics from J. Salleron, of Paris; for light, optics, and electricity from Stoehrer, of Leipsic, and and Browning and Newton, of London; pneumatic and electrical apparatus from E. S. Ritchie, of Boston; and a large number of pieces prepared at the mechanical shops of the University. It includes, also, Browning's electrical lamp; and from Eliot Brothers, and other makers, London, resistance coils, galvanometers, ammeters, and voltmeters for higher researches in electricity.

A room on the ground floor is especially devoted to instruction in electrical measurements.

FRENCH AND GERMAN.

See *College of Literature and Science.*

THESES.

In all the schools in this College a thesis is required as a condition of graduation. It must be an original composition of suitable length, upon a subject appropriate to the school, and approved by the professor in charge. It must be upon regulation paper; must be illustrated with such photographs, drawings and sketches as may be needed; and embellished with a title page neatly printed or lettered with India ink or colors. It will be prepared during the latter part of the fourth year, and presented at the close of the course, after which it will be deposited in the library of the University.

CONTRIBUTIONS.

Our friends and students are invited to send us specimens of material and manufactures, and drawings, models, or photographs of machinery, bridges, and other engineering and architectural work. Finished and detailed working drawings, perhaps otherwise useless, may be of great value for instruction. Illustrated circulars and price lists of manufact-

uring firms are desired. Contributions will be labeled with donors' names, and placed in the museum of industrial arts for the inspection of students and the illustration of lectures.

MECHANICAL ENGINEERING.

OBJECT.

This course is designed to prepare students for the profession of mechanical engineering. It aims to fit them to invent, design, construct, and manage machinery for any branch of manufactures. The state needs men who, to a thorough knowledge of the principles of machinery and of the various motors, add the practical skill necessary to design and construct the machines by which these motors are made to do work.

INSTRUCTION.

The instruction, while severely scientific, is thoroughly practical. It aims at a clear understanding and mastery of all mechanical principles and devices. Practice in the workshop is required as one of the studies of the course.

In *principles* instruction is imparted by lectures, illustrated plates, and text books. Examples are given, showing the application of the theories and principles taught. Experiments in the testing of machines and motors are undertaken by the student.

In *practice* elementary forms are produced and projects are executed, in which the student constructs machines, or parts thereof, of his own designing, and from his own working drawings.

In *designing* the student begins with elements and proceeds with progressive exercises till he is able to design and represent complete machines

MECHANICAL ART AND DESIGN.

A scheme of elementary shop practice has been carefully arranged, to familiarize the student with the forms of the parts of machines, and the mode of producing them. He is made familiar with all the ordinary cutting tools for iron or wood; with the form and condition for most effective work; with the machines and appliances by which they are put in action, and the instruments by which desired dimensions of product are obtained. This practice is obtained in the mechanical laboratory, and represents five different shops, viz:

1—Pattern Making.
2—Blacksmithing.
3—Foundry Work.
4—Bench Work for Iron.
5—Machine Tool Work for Iron.

In the 1st, the practice consists in planing, turning, chiseling, etc., in producing true surfaces in various forms in wood, and also in combining pieces by glue joint, etc., preliminary to correct pattern making; patterns are finally made from which are cast pieces in iron, brass, etc., to be worked in the subsequent shops.

In the 2d, the student uses the forge and performs the various elementary operations, such as drawing, upsetting, bending, welding, etc.

In the 3d, the processes of moulding and casting are fully illustrated.

In the 4th, there is first a course of free-hand bench work, the cold chisel and file being the only tools. After the hand and eye are sufficiently trained, fitting is begun, and the square, bevel, rule, compasses, and other auxiliary bench tools are used. Pieces are then fitted together by the file, with surfaces carefully finished.

In the 5th shop, the ordinary machine tools of the machine shop are used. The first practice employs these machines with their cutting tools or bits, in common operations, such as turning cylinders, discs, grooves, and fillets; boring, drilling, hand-turning, milling, planing, etc. Following this is a course of practice in fitting and finishing, in which calipers, rules, etc., are introduced, and many of the various fittings employed in machinery are produced.

Previous to the shop-work, drawings of the pieces are made by the student, and the exact thing to be done is indicated; thus mistakes are avoided and practice facilitated.

The designing of such machine elements as pulleys, journal boxes, cranks, stuffing boxes, etc., cultivates a knowledge of proportion, and of its proper representation on paper. This course of elementary practice fits the student for the advanced shop practice in designing and construction of complete machines undertaken later in the course.

SPECIAL STUDIES.

Principles of Mechanism.—Relative motion of points in a system of connected pieces; motion independent of force; velocity ratio; investigation of motion of elementary parts of machines, as friction and non-circular wheels in rolling contact, cams and curves in sliding contact; teeth of wheels; spur, bevel, and screw gearing; link-work; quick-return motions; escapements; trains of mechanism; epicyclic trains; straight line motions.

Heat Engines.—The theories of air, gas, and steam engines; discussion of the various types; efficiency; proportions of steam boilers.

Hydraulic Engines and Wind Wheels.—Water-pressure engines; turbines and other water wheels; principles of design and efficiency.

Theory of wind wheels; types and methods of governing; applications and comparative economy.

Machine Drawing.—Detailed designs of machines in whole or in part, such as link and valve motions, governors, steam boilers and engines, hydraulic presses, etc, with due consideration of strength, economy of construction, accessibility for repairs, etc.

Mill Work and Machinery.—Methods of transmitting power; calculations for shafting, gearing, pulleys, belts, chains, wire or hemp rope; efficiency of various modes of transmission; best forms for long and short distances.

Dynamo-electric Machinery.—The theory of dynamos and motors; principles of design; discussion of different types; efficiency; methods of governing; electric distribution of power; long distance transmission.

PROJECTS AND PRACTICE.

The shop practice of the first year has already been described. The second-year practice has for its object the production of some model or machine. The students, under the immediate direction of the teachers, carefully determine the dimensions and shapes best suited for the parts of some machine, produce them in neat and accurate working drawings, and make tracings for shop use. No student will commence his advanced shop practice without working drawings. The designs are such as require execution in iron, brass, and wood, for the purpose of giving variety of practice. The student is required to make the patterns and castings, finish the parts, and put them together in accordance with the working drawings and the required standard of workmanship. This acquaints him with the manner in which the mechanical engineer carries his design into execution, and teaches him so to shape, proportion, and dispose the parts of a machine as to secure the greatest economy of construction and durability in use. The practice of the third year includes the careful construction of mechanical movements, strictly in accordance with the theoretical determination of the form of the parts.

The steam engine, large drill press, one engine lathe, the hand lathes, the milling machine, and other machinery now in use, were designed here, and built in the shop by students in the department.

Besides these practical exercises, students of sufficient skill may be employed in such commercial work as is undertaken by the shop.

Experiments and Practical Problems.—Experiments in the testing of prime movers and other machines, are undertaken by the students. They take indicator diagrams from the engines of the mechanical laboratories, analyze them, and by means of the friction brake determine the

loss in engine friction. They make evaporative tests of boilers and determine the percentage of moisture in the steam by the use of the calorimeter.

APPARATUS.

This department is provided with plates and a cabinet of models illustrating mechanical movements and elementary combinations of mechanism. This collection is rapidly increasing by our own manufacture, and by purchase from abroad. It includes many of Riggs's models, and others from the celebrated manufactory of J. Schroeder, of Darmstadt, Germany. About two hundred valuable models from the United States Patent Office are also included in the cabinet.

The state has provided a large mechanical laboratory and workshop, furnished with complete sets of tools, benches, vises, and forges, with flasks for moulding in sand, and cupola for melting iron.

STUDIES.

The studies are given by the year and term in the tabular view of the course. The order there indicated should be closely followed, that the student may avoid interference of his hours of recitation.

COURSE IN MECHANICAL ENGINEERING,

Leading to the Degree of B.S.

FIRST YEAR.

1. Advanced Algebra; Projection Drawing; French or German; Shop Practice.
2. Trigonometry; Descriptive Geometry and Lettering; French or German; Shop Practice.
3. Analytical Geometry; Advanced Descriptive Geometry; French or German; Shop Practice.

SECOND YEAR.

1. Differential Calculus; Physics; French (optional); Mechanical Construction.
2. Advanced Analytical Geometry; Physics; French or German (optional); Mechanical Construction.
3. Integral Calculus; Physics; French or German (optional); Mechanical Construction.

THIRD YEAR.

1. Analytical Mechanics; Chemistry; Mechanism.
2. Resistance of Materials; Chemistry; Engineering Materials.
3. Mill Work; Hydraulics; Chemistry or Geology or Astronomy.

FOURTH YEAR.

1. Mental Science; Heat Engines; Machine Drawing.
2. Constitutional History; Hydraulic Engines and Wind Wheels; Estimates.
3. Political Economy; Dynamo-Electric Machinery; Machine Drawing.

ELECTRICAL ENGINEERING.

The University is now prepared to offer, as a second course in the department of Mechanical Engineering, a full course of Electrical Engineering. The first two years of this course will be identical with those of Mechanical Engineering, which evidently furnishes the only rational foundation upon which an electrical course may be built. The mechanical course has already offered such an amount of instruction in electrical specialties as has enabled its graduates to take service promptly and efficiently in electrical work. A well equipped electrical laboratory will be open in the fall term, with dynamos, motors, batteries, and all forms of instruments for the theoretical and practical discussion of the subject in all its phases, for measuring electric forces, and for testing electric apparatus.

COURSE IN ELECTRICAL ENGINEERING,

Leading to the Degree of B.S.

In the first and second years, this course is identical with the course in Mechanical Engineering.

THIRD YEAR.

1. Analytical Mechanics ; Chemistry ; Mechanism.
2. Resistance of Materials ; Chemistry ; Engineering Materials.
3. Mill Work ; Hydraulics ; Dynamo-Electric Machinery.

FOURTH YEAR.

1. Mental Science ; Heat Engines ; Electric Measurements.
2. Constitutional History ; Hydraulic Engines and Wind Wheels ; Electrical Laboratory.
3. Political Economy ; Electrical Transmission of Power ; Electrical Laboratory.

CIVIL ENGINEERING.

OBJECT.

The design is to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

INSTRUCTION.

While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The power to acquire information and the ability to use it, is held to be of far greater value than any amount of so-called practical acquirements. The method of instruction consists in coupling the development of intellectual power with the acquisition of information directly useful to the civil engineer in his profession.

The instruction is given by lectures, text books and reading, to which are added numerous problems and practical exercises, as will serve best to explain principles completely and fix them in the mind. Models and instruments are continually used, both in lectures and by the students themselves.

APPARATUS.

For Field Practice.—The school is provided with the instruments necessary for the different branches of engineering field practice, including chains, tapes, compasses, plane tables, stadias, transits, levels, barometers, base rods and comparing apparatus, sextants, engineer's transits arranged for astronomical observation, and solar compass attachments for transit.

A portable altitude and azimuth instrument of the latest and best form, from the celebrated makers, Troughton & Simms, of London, is used for instruction in geodesy and practical astronomy. It is read by micrometer microscopes to single seconds, both of altitude and of azimuth. The astronomical observatory is provided with an equatorial telescope, an astronomical transit, with attachment for zenith telescope work, a chronometer, and a set of meteorological instruments.

To facilitate practice in surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. All possible distances, directions, areas, and elevations are accurately known ; hence the instructor knows beforehand the precise result which the student should obtain. Not a single problem or exercise is given in which there is wanting an absolute check upon the accuracy of the work. This is an incentive to the student and enables the teacher to show him the degree of accuracy attained and also to point out errors.

For the Lecture Room.—The school has numerous models for illustrating its specialties, including models of bridges, roofs, joints, and

connections ; a large collection of drawings, photographs, and photo-lithographs of bridges, roofs, and engineering structures, numerous railway maps, profiles, etc.; maps of government surveys, and plans and specifications. It has access to a complete set of lithographs of the lectures and drawings used in the government polytechnic schools of France. The industrial museum contains a large collection of building materials, of wood, brick, stone, and iron. The testing laboratory has a machine with a capacity of a hundred thousand pounds for tension, compression, or bending ; also a cement testing machine.

The library is well supplied with the best and latest periodicals and books upon engineering subjects, to which the students have full access.

PRACTICE.

In the fall term of the second year the class solves numerous problems in distances, areas, etc., using the chain, compass, and plane table. During the winter term the students have practice with all the engineering instruments and solve problems with the transit, stadia, level, and sextant. In the spring term the class makes a topographical survey of a locality, using the stadia and plane table as in the United States surveys.

In the fall term of the third year the class executes a project in railroad engineering, which consists of preliminary surveys, location, staking out, drawings, computation of earth-work, etc. The preliminary survey consists in an examination of the locality, and in running tangent lines, with leveling and topographical sketching. The location consists in running the line over the route decided upon, with all the necessary measurements and calculations for establishing the grade, setting slope stakes, etc. The drawings include alignment, profile, etc.

In the fall of the fourth year the student has practice with the alt-azimuth instrument in reading horizontal and vertical angles; and in determining latitude; with the astronomical transit in finding time; with the sextant in getting time and latitude; with the aneroid and mercurial barometers in measuring heights, and with the precise level in leveling.

SPECIAL STUDIES.

Astronomy.—Descriptive astronomy is given with a text book. The equatorial telescope is in constant use during favorable weather. Practical astronomy is given by lectures and the use of the alt-azimuth instrument, the astronomical transit, the sextant, and the engineer's transit, adapted to astronomical calculations. The work includes the use and adjustment of instruments, and the determination of time, latitude, longitude, and azimuth.

Bridges.—The instruction in bridges occupies two terms. The first is devoted to the calculations of the strains in the various forms of bridging, by algebraic and graphical methods, consideration being given to weights of bridge and train, and force of wind. The second is devoted to designing trusses, proportioning sections, and working out of details. Each student designs and makes a full set of drawings of a bridge.

Geodesy.—From a text book studies are made upon the instruments, methods, formulas, etc., employed in spirit, barometrical, and trigonometrical leveling; the apparatus, methods, etc., used in measuring base lines; the location and construction of stations; the method of measuring the angles and reducing the triangulations; the principles of projecting maps; the means employed in running parallels and meridians.

Land Surveying.—Areas and distances by chain, compass, and plane table; U. S. public land surveys, including legal points involved in the re-establishment of boundaries; magnetic variation and determination of true meridian.

Masonry Construction.—Requirements and methods of testing stone, brick, cement, and lime; composition, preparation and strength of mortar and concrete; classification, construction, strength, cost of stone and brick masonry; foundations under water; theory of stability; cost, etc., of dams, retaining walls, bridge piers, bridge abutments, culverts, and arches.

Railroad Engineering.—Instruction is given from text books and by field practice. In the former are studied the principles of economic location, particularly the effect of distance, grade, and curve upon operation; the inter-adjustment of grades and curves; also the mathematical theory of curves, turn-outs, crossings, and the calculation of earth-work. In field work the class makes at least two preliminary surveys and one location of a short line, of which each student is to present a complete set of notes, calculations, maps, etc.

Topography.—Use of stadia, plane table, and level in topographical surveying. Topographical drawing includes sketching, platting field notes, conventional signs, and city and county maps.

Theory of Engineering Instruments.—Examination of workmanship and design; testing instrument makers' adjustments; making engineer's adjustments; determination of areas with transit; inaccessible and air line distances with transit; profiles and practice with level; heights and distances with stadia; measurements of angles with sextant, etc.

Sewerage.—Sewerage systems ; water-carriage systems, separate and

combined; determining size and capacity of sewers to carry off storm water and for house drainage alone; design and construction of sewers and sewer appurtenances; sewage disposal by chemical precipitation, filtration, irrigation, etc.; estimates and specifications.

Hydraulics.—Weight and pressure of water; head; velocity and discharge through orifices, weirs, tubes, pipes, conduits, canals, and rivers; measurement of pressure, velocity, and discharge; water power; water-works engineering; pumping plant, mains, stand-pipes, and reservoirs; sources of supply; impurities and their removal.

Roads and Streets.—Location, construction, and maintenance of earth roads. Examination of the relative merits of gravel, broken stone, brick, stone blocks, wood, and asphalt as road surfaces. Specifications and details of construction of the various forms of street pavements, curbs and gutters, side walks and cross walks. Street cleaning.

COURSE OF STUDY.

The complete course occupies four years. The several subjects included therein are shown in the list below. Each study requires five recitations per week, and should receive daily from three to four hours of the student's time. Some of the class exercises occupy one hour daily, while others require two hours; as a rule the latter require less time for preparation. The order of studies as given by the year and term in the tabular view of the course, should be closely followed to avoid interference in hours of recitation, and because the studies are there given in the order which best meets the preparation of the student.

COURSE IN CIVIL ENGINEERING,

Leading to the Degree of B.S.

FIRST YEAR.

1. Advanced Algebra; Projection Drawing; Shop Practice; French or German.
2. Trigonometry; Descriptive Geometry and Lettering; French or German; Shop Practice.
3. Analytical Geometry; Advanced Descriptive Geometry; French or German; Shop Practice.

SECOND YEAR

1. Differential Calculus; Physics; French (optional); Land Surveying.
2. Advanced Analytical Geometry; Physics; French or German (optional); Theory of Instruments.
3. Integral Calculus; Physics; French or German (optional); Topography.

THIRD YEAR.

1. Analytical Mechanics; Chemistry; Railroad Engineering.
2. Resistance of Materials; Chemistry; Roads and Streets.
3. Astronomy; Hydraulics; Chemistry or Geology.

FOURTH YEAR.

1. Mental Science; Geodesy; Masonry Construction.
2. Constitutional History; Bridge Analysis; Sewerage.
3. Political Economy; Bridge Construction; Mine Attack.

MINING ENGINEERING.

OBJECT.

This course has been provided to meet the growing demand of a very important industry for thoroughly trained engineers; fitted to solve the numerous perplexing problems which are constantly arising in all mining work. The subjects of the discovery, opening, economical working and proper ventilation of mines, the prevention of accidents, transportation above and below ground, treatment of products, with many others which fall within the scope of the mining engineer, can be mastered only by a careful study of facts and principles. This is the proper foundation for the practical work of the profession, and it is the aim to present this in the most complete and thorough manner.

INSTRUCTION.

It is important that a broad basis be laid by way of general preparation for the more technical studies here included. Whatever of general culture the student may obtain before entering the University, will not come amiss, and, although the requirement is not made, it is advised that all who can do so should acquire a reading knowledge of French or German before beginning this course.

The course comprises the greater part of the pure and applied mathematics of the course in mechanical and civil engineering. Much time is devoted to chemistry and geology, with the addition of metallurgy and other technical studies peculiar to mining engineering.

Students who are graduated from this course are not supposed to be familiar with all the details of mine management from actual experience, but they will have obtained such a knowledge of the principles underlying all sucessful practice, and such a familiarity with the science of mining in all its branches, that the art may be acquired with the minimum of practice.

Lectures are given when desirable, but these are to be regarded as supplementary to other modes of instruction which are made to conform

as closely as possible to the routine of the engineer in practice. In every detail the student is made to feel that he is dealing with the actual problems which he will meet in his professional work.

Plans, estimates, drawings, reports, and calculations, based upon data obtained in the student's own experience, are constantly required, and no pains is spared to familiarize each member of the class with the duties and responsibilities of every grade, from miner to manager.

COURSE OF STUDIES.

In the first two years the work is similar to that required in the course in civil engineering, but more time is given to chemistry. In the third year geology and mining engineering, with assaying and metallurgy, take the place of special technical studies in the other engineering courses. In the fourth year with the exception of two terms of prime movers taken with the students in mechanical engineering and some studies of general character the work is strictly technical.

SPECIAL STUDIES.

Mine Surveying and Reconnoitering.—History, uses and adjustments of instruments; solar compass and various solar attachments; practical problems involving the running of surface lines and lines under ground; connecting of surface and underground surveys; practice of U. S. deputy surveyors. Details of mine surveys, setting of bench marks, lines through shafts, drifts, stopes, etc.; keeping of records, plans, etc. Surveys required to determine best locations for test borings, shafts, adits, etc.; methods of reconnoitering.

Mining Engineering.—*1. Attack.*—Tools, implements, machinery, and explosives, with principles governing their use. Methods of boring, sinking, and driving through hard, soft, wet, dry, loose, or compact material.

2. *Timbering.*—Objects, methods, etc.; framing, fitting, bracing.

3. *Transportation.*—Underground haulage, hoisting, use of chutes; apparatus and appliances, cars, tracks, switches, cables, cages, motive power, connections; haulage in inclines, "man-engines," etc.

4. *Drainage.*—Pumps, pumping, sumps, ditches; drainage of working shafts and inclines.

5. *Ventilation.*—Means and appliances. Importance of subject; laws of various states and countries. Discussion of fundamental principles and practical applications, with results.

6. *Buildings and Machinery.*—Hoisting apparatus, air compressors, power drills, etc.

7. *Exploration.*—To determine general character and extent of deposits in advance of development; methods and aims.

8. *Development.*—Blocking out of deposits to prove values of partly explored ground, and to prepare for further explorations.

Exploitation.—Laying out work; winning of coal, ore, etc.; stoping, overhand and underhand; winzes and intermediate levels; economical handling of product. Methods to be employed under various conditions.

Dislocations.—Faults, upthrows, downthrows, feeders, leaders, rolls, swells, etc. Means of overcoming difficulties.

Dressing of Products.—Coal screening and washing; sampling and grading ore; assorting, crushing, spalling, cobbing, concentrating.

Mining Machinery.—Elements of construction, designing of plant, combination of parts; setting, arranging, adjusting. Preservation and operation, general economy.

Organization.—Economy of management. Secondary superintendence; division of labor and adjustment of responsibility. Prevention of accidents.

Administration.—Review of principles. System of reports from sub-officers, and tabulation of records. Accounts, forms, analyses, pay-rolls, cost sheets, etc. Letting and measuring contracts. Miscellaneous details.

Engineering Geology.—Applications of geology to engineering and mining. Nature and distribution of deposits of economic value, as coal, water, metallic ores, etc.; advanced structural geology and lithology; discussion of principles underlying successful working of mines, placing of foundations, setting of machinery, and erection of structures in various situations. Relation of geological structure to drainage, economy of working, selection of points of attack, methods of exploration, etc.

APPARATUS.

The department has a valuable collection of models of mining and metallurgical machinery.

The newly equipped laboratory now contains a very complete line of illustrative machinery, designed for practical use, and covering a wide range of metallurgical processes. The machines are operated by steam power, and include apparatus for crushing, screening, washing, concentrating, leaching, precipitating, and many other methods of ore treatment of the latest modern types.

In the manipulation of these machines, and the tests made on a working scale, the student is afforded opportunity for practice illustrative of the class-room work. The plant consists of a Dodge ore-crusher, a pair of Cornish rolls, elevator with deflecting spouts, automatic sampler, re-

volving screens, separators, rotating table, jigs, etc.; chlorine generator, tanks, vats, and troughs, gas and blast furnace, with suitable appliances so arranged that they may be used together or separately as occasion may require.

The extensive apparatus of other departments is equally available for this.

COURSE IN MINING ENGINEERING,

Leading to the Degree of B.S.

FIRST YEAR.

1. Advanced Algebra; Projection Drawing; Chemistry; French or German.
2. Trigonometry; Descriptive Geometry and Lettering; Chemistry; French or German.
3. Analytical Geometry; Free-hand Drawing; Chemistry; French or German.

SECOND YEAR.

1. Land Surveying; Differential Calculus; Physics.
2. Theory of Instruments; Advanced Analytical Geometry; Physics.
3. Topographical Surveying; Integral Calculus; Physics.

THIRD YEAR.

1. Mine Attack; Analytical Mechanics; Mineralogy.
2. Geology; Resistance of Materials; Assaying.
3. Geology; Mining Surveying; Metallurgy.

FOURTH YEAR.

1. Mining Engineering; Heat Engines; Mental Science.
2. Engineering Geology; Hydraulic Engines and Wind Wheels; Constitutional History.
3. Mining Engineering; Mine Administration; Political Economy.

ARCHITECTURE.

OBJECT.

The design is to prepare students for the practice of the profession of architecture. A thorough knowledge of scientific principles applied to construction, ability and refined taste in design, a technical acquaintance with the processes of the various building trades, and some skill in the use of tools, are necessary for this, and are made prominent objects of the course of instruction.

The course of study comprises the theory and practice of construction, the history and esthetics of architecture, draughtsmanship, and the usual work of office practice, so far as this can be taught in a professional school. Technical instruction is imparted by recitations from text books,

lectures, and especially by the application of principles to practical cases; engravings, photographs, and models are employed as illustrations.

Drawing is practiced during the entire course, and designing is introduced early, so that original work is done whenever possible. Drawing from casts and modeling in clay give command of the hand, facility in sketching, and a knowledge of beautiful forms.

Shop practice comprises elementary forms and joints in carpentry and joinery, and experience in cabinet-making and turning, as well as the construction of models of architectural structures at a reduced scale.

SPECIAL STUDIES.

Elements of Drawing.—Lectures; designs for specified problems; outline sketches and finished drawings from casts, in pencil, crayon, charcoal, etc.

Water Color Painting.—Practice in elementary landscape painting and sketching from nature in water colors.

Wood Construction.—Materials and tools; frames, floors, roofs, ceilings, domes, heavy frames, roof trusses, stairs, doors, windows, cornices, etc.; external and internal finish.

Stone Construction.—Materials, mortars, and cements; concrete; walls, foundations, arches, and vaults; tools and processes of stone-cutting.

Brick Construction.—Material, bonds, walls, arches, vaults, centerings, terra cotta, tiles.

Metal Construction.—Manufacture and uses of cast iron, wrought iron, and steel; forms employed in construction; connection by joints, rivets, pins, etc.; columns, lintels, girders, and beams.

Tinner's Work, Slating, Plastering, etc.

Sanitary Construction.—Principles of sanitary science; plumbing, water supply, and sewerage; uses of engineering; instruments in surveys for drains, buildings, etc.

Architectural Drawing.—Preparation of a set of drawings as practiced in offices; conventional coloring; drawing the orders; finishing drawings in line, ink, sepia, and color; architectural shades and shadows.

Architectural Perspective.—Study and application of the practical methods explained in Ware's Perspective; original designing in perspective applied to practical problems.

Architectural Designing.—Original sketches and finished designs for specific projects. Several problems are given each term, progressing from simple to complex. Drawings neatly finished in shade and colors.

History of Architecture.—Careful study of the leading historical styles, their derivation, characteristics, construction, applications; most im-

portant monuments of each style. Especial prominence is given to those ideas in design which might be useful and suggestive in the development of American architecture.

Esthetics of Architecture.—Study of principles of esthetics as applied to architecture and allied arts; proper treatment of building materials and of the different portions of a building, as well as of its general form; problems requiring original designs.

Estimates.—Methods of measuring builders' work; cost of labor and materials; preparation of estimates for numerous practical examples.

Agreements and Specifications.—Study of principles and examples; preparation of a set of papers for letting contracts for building.

Heating and Ventilation.—Heat, production, losses through walls; flow of air in ducts; obstructions; heating by fireplaces, furnaces, stoves, steam, and hot water. Ventilation, requirements and methods; application to numerous problems.

Graphical Statics.—Elements; equilibrium polygon and its applications; loads and wind pressures on roofs; typical forms of roof trusses; examples; determination of strains in members, sectional dimensions and details of connections at the joints; construction and use of graphical tables.

SPECIAL EXERCISES.

Specimen plates or tracings are required of each student at the close of each term in drawing or designing, to form a part of his record. These must be made in accordance with the materials and dimensions prescribed, and be finished as directed.

SHOP PRACTICE.

To give a practical knowledge of various kinds of work, three terms are devoted to a course of instruction, which all architectural students are required to pursue, unless they have previously had equivalent practice and obtain credit therefor.

First Term.—Carpentry and Joinery. Planing flat, square, and octagonal prisms and cylinders; framing with single, double, and oblique tenons; splices, straight and scarfed; mitre, lap, and gained joints; through and lap dovetails; mouldings, mitres, mitre-box, and panels.

Second Term.—Turning and Cabinet-making. Glue-joints; mouldings; inlaying; ornamental veneering; turning cylinders, balusters, ornamental forms, capitals, rosettes, vases, etc.

Third Term.—Construction of portions of buildings or of complete architectural structures at a reduced scale; roof trusses, stairs, frames of wooden buildings, etc., made from drawings.

APPARATUS.

A collection of casts donated by the Spanish government, and another of casts of various architectural details from Lehr, of Berlin, belong to the department of Architecture and Design; models of ceilings, roof trusses, stairs and Schroeder's models of joints in wood-work and of construction in cut stone-work, in the engineering museum.

The department of Architecture possess a large and rapidly increasing collection of engravings and photographs illustrating the history of architecture and art and their practical applications in all ages. The collection is mounted on about 5,000 cards, 11x14 inches, and is classified in two parts, one for the use of the class in history of architecture, the other for use by the various classes in designing; both series are minutely subdivided to facilitate easy reference, and are always open for free use, thus forming a most valuable working library. The plates issued by the most important American architectural journals are to be found here.

The casts, photographs, etc., of the art gallery. In the University Library are many of the best English, German, French, and American architectural works and periodicals.

A large and well-equipped carpenter and cabinet shop containing cabinet benches and sets of fine tools for class in shop practice; foot and power lathes; machine saws, planer, moulder, tenoner, shaper, jig saw, etc.

The use of the large testing machine, capacity 50 tons.

COURSE IN ARCHITECTURE,

Leading to the Degree of B.S.

FIRST YEAR.

1. Advanced Algebra; Projection Drawing; French or German; Shop practice.
2. Trigonometry; Descriptive Geometry and Lettering; French or German; Shop Practice.
3. Analytical Geometry; Advanced Descriptive Geometry; French or German; Shop Practice.

SECOND YEAR.

1. Differential Calculus; Physics; French (optional); Wood Construction.
2. Advanced Analytical Geometry; Physics; French or German (optional); Stone, Brick and Metal Construction.
3. Integral Calculus; Physics; French or German (optional); Sanitary Construction.

THIRD YEAR

1. Analytical Mechanics; Chemistry; Architectural Drawing.
2. Resistance of Materials; Chemistry; History of Architecture; Architectural Drawing.
3. Graphical Statics; History of Architecture; Astronomy or Geology, or Drawing and Modeling.

FOURTH YEAR.

1. Mental Science; Esthetics of Architecture; Architectural Perspective.
2. Constitutional History; Designing; Heating and Ventilation.
3. Political Economy; Designing ; Estimates and Specifications.

Builders' Course.

The Trustees permit persons desiring to fit themselves for foremen and builders to take a course of a single year, pursuing only the selected studies of the architectural course prescribed in the following course of study.

For admission to the builders' course, students must pass the examinations in English grammar, arithmetic, geography, and U. S. history, but are not required to pass in the studies of the preliminary year, unless they wish to pursue studies other than those prescribed in the following list. A special fee of $5 per term is charged in addition to the other University fees.

Builders' Course of Study.

1. Wood Construction; Projection Drawing; Shop Practice (Carpentry and Joinery).
2. Stone, Brick, and Metal Construction; Architectural Drawing; Shop Practice (Stair Building).
3. Graphical Statics; Architectural Designing; Shop Practice (Cabinet Making.

This course will not be continued after the college year ending June, 1892.

COLLEGE OF NATURAL SCIENCE.

COURSES.

CHEMISTRY, NATURAL HISTORY.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, PH.D., LL.D., REGENT.
STEPHEN A. FORBES, PH.D., *Dean*; Zoölogy and Entomology.
THOMAS J. BURRILL, PH.D., Botany and Horticulture.
SAMUEL W. SHATTUCK, C.E., Mathematics.
EDWARD SNYDER, M.A., Modern Languages.
JAMES D. CRAWFORD, M.A., History.
JAMES H. BROWNLEE, M.A., Rhetoric and Oratory.
CHARLES W. ROLFE, M.S., Geology.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Industrial Art.
SAMUEL W. PARR, M.S., Analytical Chemistry.
SAMUEL W. STRATTON, B.S., Physics.
ELBRIDGE R. HILLS, LT. U.S.A., Military Science.
M. R. PARADIS, M.A., French.
HOWARD S. BRODE, Asst. in Zoölogy.
HARRY S. GRINDLEY, B.S., Asst. in Chemistry.
ROBERT W. CORNELISON, B.S., Asst. in Chemistry.

ADMISSION.

Candidates for the College of Natural Science should be eighteen years of age, and must pass satisfactory examinations in the common school branches, and in the studies of the preliminary year.

Their preparations should be especially good in the scientific studies of the preliminary year. Practice in the drawing of natural objects will greatly facilitate the student's progress. A knowledge of the Latin language is a good preparation for the mastery of the scientific terms which must be learned in the course.

CHEMISTRY.

This course aims to impart such knowledge of chemistry as will enable the student to apply the principles of the science to the related

arts, and as will fit him for original research, or for business of the druggist, pharmaceutist, and practical chemist.

INSTRUCTION.

The first term of the first year is occupied by text-book instruction, lectures, and experiments in the laboratory illustrating the elementary principles of chemistry, chemical physics, and inorganic chemistry. The second term is devoted to a closer consideration of the metallic elements and their compounds, and the laboratory practice consists of a study of such reactions as constitute the basis for chemical analysis. In the third term the subject of qualitative analysis is completed, and the student has practice in the preparation of various inorganic salts, etc. Recitations continue throughout the next three years, and with the work in the laboratory constitute two hours daily work, for five days each week. Before graduation, each is required, before the end of his course, to make an original investigation, and present a thesis.

Students who pursue chemistry as a part of other courses work two consecutive hours daily, during such time as their specialties may require.

Deposits.—At the beginning of each term of laboratory practice, each student will deposit ten dollars with the business agent of the University. At the end of the term, the balance left, after deducting payment for chemicals and apparatus used, will be refunded.

Five courses of laboratory work have been arranged, as follows :

CHEMICAL COURSE.

FIRST YEAR.

First Term.—General, theoretical, and applied chemistry. Lectures, text book, and illustrative experiments in the laboratory.

Second Term.—General chemistry continued. Chemical reactions and tests. Qualitative analysis begun.

Third Term.—Principles of chemical philosophy. Qualitative analysis completed. Inorganic chemical preparations.

SCCOND YEAR.

First Term.—Advanced inorganic chemistry. Qualitative analysis of salts of known composition. Volumetric analysis. Acidimetry and alkalimetry.

Second Term.—Advanced inorganic chemistry. Assaying. Dry and wet assays of gold, silver, lead, zinc, and copper ores. Electrolytic depositions, etc.

Third Term.—Agricultural chemistry. Qualitative analysis of feldspar, milk, grain, fertilizers, etc.

THIRD YEAR.

First Term.—Organic chemistry. Principles and practice of organic synthesis. Preparation of organic compounds.

Second Term.—Organic chemistry. Organic preparations.

Third Term.—Organic chemistry. Ultimate organic analysis. Determinations of vapor densities, etc.

FOURTH YEAR.

First Term—Detection of poisons, organic and inorganic. Gas analysis.

Second Term.—Theoretical chemistry. Investigations for thesis.

Third Term.—Theoretical chemistry. Thesis work completed.

PHARMACEUTICAL COURSE.

FIRST YEAR.

Same as in chemical course throughout the year.

SECOND YEAR.

First Term.—Same as in chemical course.

Second Term.—Quantitative analysis of commercial drugs, bismuth subnitrate, tartar emetic, sodium bicarbonate, potassium iodide, sodium bromide, cream of tartar, ammonium carbonate, potassium nitrate. Volumetric determinations.

Third Term.—Same as in chemical course, substituting materia medica for agricultural chemistry.

THIRD YEAR.

First Term.—Same as in chemical course.

Second Term.—Isolation and quantitative estimation of active proximate principles of vegetable drugs—oils, resins, gums, alkaloids, glucoses, etc.

Third Term.—Practice of Pharmacy. Reading and compounding prescriptions. Preparation and valuation of tinctures, extracts, syrups, etc. Examination of commercial organic drugs.

FOURTH YEAR.

First Term.—Analysis of urine, normal and pathological. Examination of waters, mineral and potable. Alcoholic liquors, proprietary articles, etc.

Second Term.—Toxicology. Micro-chemistry of poisons. Separation of poisons from organic mixtures.

Third Term.—Original research. Thesis.

COURSE IN AGRICULTURAL CHEMISTRY.

A. Arranged for students who desire to make a specialty of chemistry in its application to agriculture and allied branches.

FIRST YEAR.

Same as in chemical course.

SECOND YEAR.

First Term.—Same as in chemical course.

Second Term.—Lectures and class work in agricultural chemistry. Analysis of feldspar, soils, ash of plants, drain waters.

Third Term.—Agricultural chemistry. Analysis and valuation of commercial fertilizers and manures, and material used for manures, apatite, phosphates, guanos, nitrates, ammonia salts, animal matters, and potash salts.

THIRD YEAR.

First Term.—Proximate analysis of farm products and cattle foods; grain, roots, fodders, commercial foods, etc.

Second Term.—Analysis of milk, butter, and cheese. Determination of sugars by polariscope and by titration. Examination of alcoholic liquors.

Third Term.—Original research.

B. Arranged especially for regular students in the school of agriculture.

FIRST YEAR.

Same as in chemical course.

SECOND YEAR.

First Term.—Same as in chemical course.

Second Term.—Agricultural chemistry. Lectures and class work. Analysis of feldspar, soils, plant ash, fertilizers and manures, and the materials used in their productions; phosphates, nitrogenous matters, and potash salts.

Third Term.—Agricultural chemistry. Lectures and class work. Analysis of farm products—grains, roots, fodders, commercial foods, milk, butter, and cheese.

METALLURGICAL COURSE.

FIRST YEAR.

First Term.—Same as in chemical course.

Second Term.—Same as in chemical course.

Third Term.—Same as first term, second year chemical course.

SECOND YEAR.

First Term.—Analysis of ores, iron, manganese, zinc, copper, lead, nickel, etc

Second Term.—Assaying. Same as in chemical course, (Students who pursue this term's work must have had one term of mineralogy.)

Third Term.—Analysis of refractory materials, fluxes and slags.

THIRD YEAR.

First Term.—Gas analysis. Same as in chemical course. Study of furnace gases.

Second Term.—Analysis of fuels—wood, anthracite and bituminous coals, coke; determination of heating power.

Third Term.—Analysis of cast iron, wrought iron, and steel. Determinations of sulphur, silicon, manganese, phosphorus, and the forms of carbon.

The above course has been arranged for students desiring to make a specialty of chemistry in its application to metallurgy. For students in the course of Mining Engineering the work of the first year described, together with the following, is presented:

SECOND YEAR.

First Term.—Analysis of ores—iron, zinc, copper. Analysis of crude metals—iron, determination of sulphur, silicon, manganese, phosphorus, and the forms of carbon.

THIRD YEAR.

Second Term.—Assaying, same as in chemical course, third term. Metallurgy, with laboratory practice. Analysis of fluxes, slags, fuels, etc.

APPARATUS.

A large laboratory building, 75 x 120 feet, and four stories in height, is devoted to this specialty.

The basement contains furnace room for assaying and metallurgical operation; a mill room for storing and crushing ores; and a large room for the manufacture of chemicals and pharmaceutical preparations. The first story contains a lecture room capable of seating 200 persons, and a qualitative laboratory large enough to accommodate 152 students; one hundred and four desks are now fitted, each having an evaporating hood, gas, and water. There are a spectroscope table, a blow-pipe table for general use, and a store-room stocked with apparatus and chemicals. The second story, designed for the use of advanced students, has the following apartments: A lecture room with mineralogical cabinet, and furnace models for illustrating lectures on metallurgy; laboratory for students in agricultural chemistry; large laboratory for quantitative analysis, now containing sixty-four desks; a balance room,

containing chemical balances of the manufacture of Bunge (short beam), Becker & Son, Troemner; a pharmacy, furnished like a drug store, with shelves, drawers, prescription desk, balance, graduates, etc., and containing a full set of drugs and pharmaceutical preparations made in the laboratory by students in pharmacy; private laboratory for instructors; a gas analysis room, entirely cut off from the system of heating and ventilating, to avoid undue fluctuations of temperature, furnished with a table specially constructed, and containing a full set of Bunsen's gasometric apparatus, an inductive coil, battery, mercury, etc.; and a store-room with apparatus for all kinds of work in quantitative analysis.

The apparatus for general use includes a large platinum retort for the preparation of hydrofluoric acid; a Geissler's mercurial air pump; Hoffman's apparatus for illustrating the composition of compound gases; a Soliel-Scheibler's saccharimeter; an excellent set of areometers; a Hauy's goniometer; a camera with Ross lenses; a Ruhmkorff's coil; galvanic batteries; a galvanometer; a spectroscope; microscopes; gas combustion furnaces for organic analysis, etc.

On the mansard floor ample provision has been made for the study of photography.

COURSE IN CHEMISTRY,

Leading to the Degree of B.S.

FIRST YEAR.

1. Chemistry, General and Applied; Advanced Algebra; Drawing; French.
2. Chemistry, with Laboratory Practice; Trigonometry; Drawing; French.
3. Chemistry, with Laboratory Practice; Conic Sections; Drawing; French.

SECOND YEAR.

1. Chemistry, with Laboratory; Physics; German.
2. Chemistry, with Laboratory; Physics; German.
3. Chemistry, with Laboratory; Physics; German.

THIRD YEAR.

1. Organic Chemistry, with Laboratory; Mineralogy; Physiology or Botany.
2. Organic Chemistry, with Laboratory; Botany: German of Science.
3. Organic Chemistry, with Laboratory; German of Science.

FOURTH YEAR.

1. Chemistry, with Laboratory; Mental Science; Geology.
2. Theoretical Chemistry, with Laboratory; Constitutional History, or Pedagogy, or Logic.
3. Theoretical Chemistry, with Laboratory; Political Economy; Physiography, Astronomy, or Pedagogy.

Students who are candidates for the degree of B.S. in the Course of Chemistry must perform the laboratory work as laid down in some one of the prescribed chemical courses.

NATURAL HISTORY.

The Course in Natural History is especially intended to provide a general preparation for the professions and business pursuits requiring more of an acquaintance with the methods and facts of science than with those of literature. More specifically it is designed:

To afford a thorough and liberal education with a basis in the sciences and modern languages.

To prepare for the teaching of the natural history subjects either in the higher schools or as a professional specialty.

To lay a liberal foundation in biological work and study for a course in medicine.

To prepare for the pursuit of specialties in zoölogy, botany, general biology, and geology, as a scientific career.

The natural history course of four years leads to the degree of bachelor of science. It is distinguished by unusually full instruction in the biological subjects and in the other modern sciences, combined with a thorough course in French and German. It offers two hours a day for a year in botany, and the same each in zoölogy and general or special biology; a term each of entomology, human anatomy, and physiology, microscopy, and mineralogy; two terms of geology and three of physics; a year of chemistry; a term each of physiography and astronomy; a year each of free-hand drawing and French; five terms each of German and history; one term each of advanced algebra, trigonometry, conic sections, political economy, mental science, and logic; and the equivalent of twenty-nine weeks' work for one hour a day, in practical English composition and oratory.

In zoölogy, botany, general biology, entomology, geology, microscopy, chemistry, and mineralogy, the subjects are developed by a thorough course of laboratory work and practice by the students, done under the guidance and criticism of an instructor, supplemented by lectures and the study of text.

The biological work of the senior year is rendered so far elective in character that it may be made to lead towards the study of medicine, natural history teaching, or the pursuit of a special scientific career.

Special and elective study is permitted and provided for, but does not lead to a degree.

Graduates in literary courses who wish also the advantages of a scientific course, may pursue elective work, or may usually take in two years the degree of bachelor of science by carrying the scientific studies of the course alone.

SPECIAL STUDIES.

Botany.—Candidates for admission are examined upon Gray's Lessons in Botany, or an equivalent, and are expected to be able to analyze common wild flowers. Beginning with the fall term of the sophomore year, systematic and structural botany is continued by recitations, illustrated lectures, and laboratory work upon fresh, dried, and alcoholic specimens. Students, throughout the course, are required to observe for themselves, and to make notes and drawings of their investigations. A series of these drawings, upon a uniform scale, together with the accompanying descriptions, is deposited in the laboratory. Each student provides himself with suitable pencils, drawing pens, paper, needles in handles, glass slides for mounting objects, and a razor for making thin sections.

The first half of the fall term is devoted to the study of the natural orders of flowering plants, their geographical distribution, importance, etc., together with a history of a few special plants and their products. During this time, students analyze in the laboratory flowering plants of the more difficult orders, compositæ, gramineæ, etc., especially such as are best obtained in autumn. During the last half of the term the general morphology of plants, including vegetable anatomy and histology, is studied, practical laboratory work with the microscope being the basis of the instruction.

The special morphology of the great divisions of the vegetable kingdom, their chief characteristics, their classifications, and the identification of species of flowerless plants, constitute the work of the second term. Special attention is given to injurious fungi. Aquaria furnish numerous kinds of fresh water algæ, and the greenhouses supply specimens in nearly all the groups studied.

Vegetable Physiology is studied in the third term. The instruction is given by lectures or text-book, and by experimental practice. The work includes: The food of plants and its absorption and assimilation; fluids, their kinds, uses, causes of movement, transpiration, respiration, etc.;

processes, peculiarities and results of growth; relations and effects of temperature, light, gravitation, etc.; self- and cross-fertilization, movements, "sleep of plants," tendrils, climbing vines, etc.

For illustration the University has a collection of about one thousand species of the plants indigenous to the State of Illinois, including a very nearly complete set of the grasses; a collection of Rocky Mountain and western plants; and many others obtained by exchange from various parts of the United States. A collection of fungi contains numerous species. The greenhouses and out-door plantations furnish a large amount of illustrative material for the classes. Enlarged *papier maché* models of flowers and fruits, exhibiting structure and development, are in the cabinet.

Throughout the course the attempt is made to introduce the students to the literature of the various subjects and to acquaint them with the authorities for the facts stated.

Microscopy.—Students have in this study further practice in the use of the compound microscope, the management of light for particular purposes, the testing of lenses, measurement of magnifying powers and angles of aperture, drawing and photographing objects, the preparation and mounting of material, etc. The application is mainly, but not exclusively, devoted to vegetables tissues and products.

The special aim is to afford the opportunity of gaining a skillful and rational use of the instrument, and an acquaintance with the best methods and processes of preparing and mounting objects. Students provide themselves with slides and covers, needles, forceps, brushes, and razors. Microscopes, section cutters, turn tables, etc., are furnished by the University.

About thirty compound microscopes represent the best American and European makers.

Anatomy and Physiology.—The students admitted to this class have already passed an entrance examination in the elementary principles of anatomy and physiology. They have also had a year's training in zoölogy, which makes a free use of the facts of comparative anatomy possible, and aids greatly in the work of the course.

The main objects of the course are to make the student familiar with the position, structure, and healthy action of those organs most liable to become diseased; to make plain the part which the nervous system plays in both the healthy and morbid action of the various organs, and in the problems of nutrition and energy.

The subject is taught during the fall term of the junior year. The plan embraces lectures, recitations from the text book, frequent read-

ings from standard authors, and demonstrations from fresh dissections, alcoholic specimens, microscopical preparations, skeletons, and the manikin.

Zoölogy.—The object of the zoölogical course is primarily to give the students command of the methods of zoölogical research and study, and to derive from these their distinctive discipline. The subject is taught ten hours a week during the whole of the sophomore year, the course being based throughout on individual work in the zoölogical laboratory, and in the field.

The more important features of the work are comparative dissections, descriptions, drawings, and microscopic preparations of types of the greater groups, as a basis for the study of the sub-kingdoms and their more important divisions; lectures on the comparative physiology of selected forms, with especial reference to their relations to their environments, organic and inorganic, present and past; studies of the zoölogical classifications, commonly introduced by analytical synopses, exhibiting the technical relations of groups; lectures and elaborate reviews directed especially to the general system of homologies by which zoölogical science is organized as a coherent whole; a course of lectures in general embryology, given with principal reference to the descent of animals, and as a preparation for later work in special embryology; and lectures on the history of zoölogical science and its final generalizations.

The *general biology* of the senior year includes comparative histology of animals, and the embryology of the chick; in plants, development and reproduction in the various groups of cryptogams and phanerogams and bacteriology.

The library and collections of the University are supplemented by by those of the State Laboratory of Natural History, and of the State Entomologist, to which the students in this department have access.

Entomology.—The study of entomology, pursued during a single term of the freshman year, is necessarily made largely empirical and practical, the subject to which it is principally directed being the place of insects in the general system of organic life; and, incidentally to this, the relations of insects to the interests of man.

The foundation for a knowledge of structural entomology is laid by the discussion and detailed study of a typical insect; and for that of the orders, by a generalization of the characters of selected groups of specimens representing each.

A large part of the time is devoted to the study of the characters, life histories, habits, and economic relations of a selected list of especially important insects. Specimens of these in their different stages,

together with synopses and descriptions of the families to which they belong, are furnished the students, and the essential facts, not discoverable by direct observation, are given in lectures or acquired by study of text.

Practice in field observation is given as opportunity offers, and all are taught the ordinary methods of the collection, preparation, and care of specimens, together with the approved methods of controlling the ravages of the injurious species.

A personal study, continuous for the term, of the life history and habit of some insect species, is made by each student and is finally reported in the form of a thesis.

In both field and laboratory work, an extraordinary opportunity is offered to competent students of this course to observe and assist in practical entomological work and original research.

Geology.—The course in geology covers a period of twenty-two weeks, two hours daily. The scheme of instruction comprises : The study of a series of localities in which great surface changes have recently taken place, in order to discover the characteristics of the forces which produced the changes and the tool-marks by which their action in former times may be traced.

The mineral composition of the different kinds of rocks ; the changes produced in their composition by the action of underground water ; the conditions under which each species was formed and the relation between these conditions, and the structure of the resulting rock ; a series of analyses covering most of the varieties of crystalline and sedimentary rocks, and the collection and identification of such erratics as can be obtained from the drift.

A somewhat rapid review of the qualities and distribution of those substances found most useful in the arts, together with the conditions which have produced them.

A study of the sub-divisions of geologic time as laid down in Dana's Manual, with the physical and organic changes which characterize them, and the distribution of the rocks laid down during each period.

An analytical study of the larger groups of fossils, with many of the more common genera and species.

A second course of eleven weeks, two hours daily, is offered to students from the chemical, civil engineering, and language courses, in which the entire subject is outlined ; detailed study is made of a few of the more important points, and some acquaintance with both rocks and fossils is gained.

A third course, one hour daily for eleven weeks, for students in mining,

is devoted entirely to a detailed study of the origin, qualities, and distribution of substances having economic value.

Mineralogy.—Fourteen weeks; about six are occupied in lectures on crystallography; Nauman's system of symbols is used and explained. A collection of models, comprising the most important forms and combinations in the various systems of crystalization, is used for illustration and study. The remainder of the term is occupied by the descriptive determination of minerals, and the use of the blowpipe. The cabinet of minerals contains a valuable and extensive collection of leads of the state, and a very considerable collection of other minerals, American and foreign.

Physiography.—This name is given to the work in a term of the senior year. The purpose is to gather the lines of investigation previously followed in the development of the physical and natural sciences into a consistent whole, culminating in a natural history of the earth and its inhabitants, including anthropology; an account of the past and present distribution of plants and animals; and an explanation of the general phenomena of meteorology and climatology.

COURSE IN NATURAL HISTORY,

Leading to the Degree of B.S.

FIRST YEAR.

1. Chemistry; Advanced Algebra; Drawing; French.
2. Chemistry; Trigonometry; Drawing; French.
3. Chemistry; Conic sections; Drawing; French.

SECOND YEAR.

1. Botany; Physics; German.
2. Botany; Physics; German.
3. Vegetable Physiology; Physics; German.

THIRD YEAR.

1. Zoölogy; Mineralogy; Physiology.
2. Zoölogy; Constitutional History; German of Science.
3. Zoölogy · Entomology; German of Science.

FOURTH YEAR.

1. Biology; Geology; Mental Science.
2. Biology; Geology; Logic or Pedagogy.
3. Biology; Physiography or Pedagogy; Political Economy.

In this course three terms of University Latin will be accepted in lieu of the three terms of French; and five terms of such Latin for the five terms of German.

COLLEGE OF LITERATURE AND SCIENCE.

COURSES.

ENGLISH AND SCIENCE. LATIN AND SCIENCE. PHILOSOPHY AND PEDAGOGY.

ANCIENT LANGUAGES.

FACULTY AND INSTRUCTORS.

SELIM H. PEABODY, PH.D., LL.D., REGENT.
EDWARD SNYDER, M.A., *Dean;* Modern Languages.
THOMAS J. BURRILL, PH.D., Botany.
SAMUEL W. SHATTUCK, C.E., Mathematics.
JAMES D. CRAWFORD, M.A., History.
STEPHEN A. FORBES, PH.D., Zoölogy and Entomology.
JAMES H. BROWNLEE, M.A., Rhetoric and Oratory.
CHARLES W. ROLFE, M.S., Geology.
NATHANIEL BUTLER, JR., M.A., English Language and Literature.
ARTHUR W. PALMER, SC.D., Chemistry.
FRANK F. FREDERICK, Industrial Art.
ELBRIDGE R. HILLS, LT. U.S.A., Military Science.
CHARLES DEGARMO, PH.D., Psychology.
HERBERT J. BARTON, M.A., Latin.
M. R. PARADIS, M.A., French.
CHARLES M. MOSS, M.A., Greek.
FANNY M. RYAN, Latin.

ADMISSION.

Candidates for the courses of English and Science and of Latin and Science will be examined in algebra, geometry, natural philosophy, physiology and botany, and Latin but not Greek.

Candidates for the course of Ancient Languages will be examined in Greek, but not in botany, physiology or natural philosophy.

Students desiring to enter the College of Literature and Science must pass the examinations in preparatory Latin before they can be matriculated.

OBJECT OF THE COURSES.

The object of the courses in this college is to furnish sound and liberal education to fit students for the general duties of life, and especially to prepare them for those business pursuits which require a large measure of literary and scientific knowledge and training. They meet the wants of those who wish to prepare themselves for the labors of the press as editors and publishers, for teachers in the higher institutions, or for the transaction of public business.

INSTRUCTION.

The plan of instruction embraces, besides the ordinary text-book study, lectures and practical exercises in all the departments, including original research, essays, criticism, and other work intended to illustrate the studies pursued, and to exercise the student's own powers.

A prominent aim will be to teach the right use of books, and thus to prepare the students for self-directed investigation and study, which will extend beyond the curriculum of his school and the period of his graduation. With this view, constant use of the already ample and continually enlarging stores of the library will be required and encouraged.

The *Library* is well supplied with works illustrating the several periods of English, American, French, and German literature, as also those of ancient literature. It contains at present over twenty thousand well selected volumes, and is constantly growing by purchase at home and abroad. Valuable American and foreign periodicals are received regularly in the reading room.

The following subjects are common to the courses of this College and may be appropriately described in this place:

MATHEMATICS.

First Term.—Advanced Algebra.—Functions and their notation; series and the theories of limits; imaginary quantities; general theory of equations. Topical reviews of all preceding algebraic processes.

Second Term.—Trigonometry, plane and spherical; fundamental relations between the trigonometrical functions of an angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications.

Third Term.—Conic sections, geometrical method. Definitions and general properties of the ellipse, hyperbola, and parabola; curvature

of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane; of the conic sections.

PHYSICS AND ASTRONOMY.

See College of Engineering, page 26.

NATURAL SCIENCE.

See College of Natural Science, page 47.

HISTORY AND SOCIAL SCIENCE.

The historical studies are designed to afford a general view of the history, social organization, and progress of the race. They embrace also the history of the arts and sciences, and of civilization, the principles of civil polity and law, the philosophy of history, and the principles of political economy and constitutional law.

The course occupies six terms in the junior and senior years of the University course.

JUNIOR YEAR.

History of Greece and Rome, and of other ancient nations; Ancient Geography; Mediæval History; Modern History; European Geography.

SENIOR YEAR.

Constitutional History of England and the United States; History of Civilization; Political Economy.

ENGLISH AND SCIENCE.

ENGLISH LANGUAGE AND LITERATURE.

In the arrangement of the studies the endeavor is to present a thorough and extended drill in grammatical and philological study, and in the authors and history of the English language, affording a training equivalent to the ordinary studies of the classical language. This drill extends through three years of the course.

The first two terms of the first year are given to a general survey of the whole field of British and American literature from the middle of the sixteenth century to the present time. All the representative writers come into notice, and representative specimens from the writings of each are carefully read in class. Moreover, each student is required each term to read an entire work of some classic author, making choice from a prescribed list. Frequent exercises in writing abstracts, or original compositions on themes assigned, are also required. The study of rhetoric occupies the third term.

During the second year a few of the great masters are studied, their work analyzed, and the shaping forces of their times, with their influences upon succeeding times, are investigated. Lectures are given from time to time on topics relating to the class work. Writing and reading required as in first year.

In the senior year the first term is devoted to early English (A. D 500-1200), for which the way has been prepared by the study of both English and German. In the second term the study of middle English (A. D. 1200-1500) is taken up, and during the third term philology is studied. Essays, forensics, and orations are required.

French and German.—The course in modern languages in this school embraces two years of French and two years of German. The chief aim is mastery in translation and composition, constant attention being also given to the etymologies common to these languages and the English; the study is thus made to contribute to the student's knowledge of his own tongue, and to the power of expression in the same.

In the first year the student completes the study of a grammar and reader, acquiring a knowledge of the technicalities of the idiom, with a vocabulary sufficient for the use of books of reference in his course. The second year is devoted to a course of select reading and composition, involving a critical study of the languages and their literature.

French and German are used in the class room as a means of conversation, as far as practicable, but this is made subordinate to the main purpose, which is to enable the student to read the languages with ease rather than to speak them indifferently.

COURSE IN ENGLISH AND SCIENCE,

Leading to the Degree of B.L.

FIRST YEAR.

1. American Authors; Advanced Algebra; French; Drawing.
2. British Authors; Trigonometry; French; Drawing.
3. British Authors; Conic Sections; French; Drawing.

SECOND YEAR.

1. English Classics; Physics; German; Drawing (optional).
2. English Classics; Physics; German; Drawing (optional).
3. English Classics; Physics; German; Drawing (optional).

THIRD YEAR.

1. History, Ancient; Chemistry; Physiology or Botany.
2. History, Mediæval; German; Zoölogy or Botany.
3. History, Modern; German; Geology or Astronomy.

FOURTH YEAR.

1. History of Civilization; Mental Science; Early English or Geology.
2. History, Constitutional; Logic; Middle English, or Pedagogy.
3. Political Economy; Civics, or History of Philosophy; Philology, or Pedagogy.

LATIN AND SCIENCE.

Under this head a course is offered to such as desire to make a special study of the Latin language, without being required to take Greek also. In other respects the subjects in this course are similar to those in the course in English and Science.

COURSE IN LATIN AND SCIENCE,

Leading to the Degree of B.L.

FIRST YEAR.

1. Cicero de Amicitia; Advanced Algebra; French; Drawing.
2. Livy; Trigonometry; French; Drawing.
3. Horace, Odes; Conic Sections; French; Drawing.

SECOND YEAR.

1. Horace, Satires; Physics; German; French (optional, fourth).
2. Terence; Physics; German; French (optional, fourth).
3. Tacitus; Physics; German; French (optional, fourth).

THIRD YEAR.

1. Latin, or History; Chemistry; Physiology or Botany.
2. Latin, or History; German; Zoölogy or Botany.
3. Latin, or History; German; Astronomy.

FOURTH YEAR.

1. History of Civilization; Mental Science; Early English, or Geology.
2. History, Constitutional; Logic; Middle English or Pedagogy.
3. Political Economy; Civics, or History of Philosophy; Philology or Pedagogy.

ANCIENT LANGUAGES.

Instruction in the Course of Ancient Languages and Literature, while aiming to impart a sufficiently full and critical knowledge of the Latin and Greek languages and writings, makes the study of these tongues subservient, in a more than usual degree, to a critical and correct use of the English. With this view, written translations, carefully prepared, with due attention to differences, equivalences, and substitutions of

idioms, and the comparison and discrimination of synonyms, form a part of the entire course.

The study of Latin and Greek composition is continued through the first year, and, to some extent, through the course. Essays, historical and critical, are required from time to time, in connection with the works read, and a free use of the library is urged. It is intended that each student who completes the course in ancient languages shall have a clear knowledge of the history of Greek and Latin literature, and of the principal authors in both languages. As an aid to the appreciation of the literature of the two peoples, Greek and Roman history form an important part of the course, and are taken up in the beginning, illustrating the works read. In the first term of the third year ancient history is taken up as a separate study, and especial attention is then given to the history of Greece and Rome, and the nations with whom they come in contact. Classes will be formed for students who wish to carry their classical study further than the prescribed course, and every assistance will be given them.

The first purpose of the instruction in a classical language, like the Greek, is to cultivate a suitable knowledge of the language. In order to do this due attention is paid to essential principles of formal grammar, relegating unessential to their proper position. Much stress is laid upon the fact that the laws of syntax are the laws of mental operation, and constitute a logical and psychological study of the first importance. The value of this thought in facilitating easy translation, is very great. As an accommodation of the uttered form of speech to the demands of a versatile people, the Greek, both in etymology and in syntax, furnishes an example of great pedagogical importance. Every effort is used to present these two phases of the study in the most rational way. Properly carried out, this greatly relieves the usual difficult and tedious routine of linguistic study.

A second purpose is to employ the literature read as a basis for the consideration of those numerous problems of life and civilization which the Greeks attempted to solve. The debt of present civilization to the Greek movement is so large and so varied that abundant opportunity is afforded for a fruitful study of the growth and descent of institutions and ideas. To effect this purpose conversations and lectures upon the governmental, moral, educational, and aesthetic ideas are used, and special studies prescribed. The University library is supplied with ample authorities for this purpose.

The two aims meet, therefore, in a common ground of living advantage to the student, as the study is of a rich language that has never ceased to be spoken, and of men whose accomplishments intimately affect all phases of modern progress.

COURSE IN ANCIENT LANGUAGES,

Leading to Degree of B.A.

FIRST YEAR.

1. Cicero de Amicitia; Hellenica; Advanced Algebra; Drawing.
2. Livy; Odyssey; Trigonometry; Drawing.
3. Horace, Odes; Memorabilia; Conic Sections; Drawing,

SECOND YEAR.

1. Horace, Satires; Demosthenes; Physics; French (optional).
2. Terence; Plato; Physics; French (optional).
3. Tacitus; Homer; Physics; French (optional).

THIRD YEAR.

1. History, Ancient; Chemistry; Physiology.
2. History, Mediæval; Quintilian; Zoölogy.
3. History, Modern; de Officiis; Geology or Astronomy.

FOURTH YEAR.

1. History of Civilization; Mental Science; Early English or Geology.
2. History, Constitutional; Logic; Middle English or Pedagogy.
3. Political Economy; Civics or History of Philosophy; Philology or Pedagogy.

PHILOSOPHY AND PEDAGOGY.

The studies of this course may follow the first two years of either of the other courses in the College of Literature and Science. It is designed especially for those who intend to enter the profession of teaching. It includes ten terms of technical work distributed during the two years. The instruction is intended to ground the student in the philosophy of teaching and training pupils, and of the management of schools.

Educational Psychology. Its chief purpose is the awakening of the pedagogical consciousness. Some of its topics are: The production of sense perceptions; clear and obscure consciousness; laws for the reciprocal action of ideas; reproduction and memory; the imagination and its significance for instruction and moral training; apperception and its supreme importance in education; attention; the fate of concepts; thinking; the judgment, the syllogism; formation and kinds of notions; fancy; the eye as concept of the body, as meeting-place of concepts; the historical eye; "we" as social eye; feelings, their content, tone, strength, and duration; relation of feelings to concepts; kind of feeling; desire, and its relations to thought and feeling; classification of desires; will and

its rise and development; freedom in mental states; reflection and self-determination; psychological freedom; reason; character.

Science of Instruction. Purposes of instruction. Interest, direct, permanent and many sided, the fundamental condition of all sound instruction. The selection, arrangement, and co-ordination of the matter of instruction; general methods of instruction, as in the apperception of individual notions, the nature and significance of generalizations in instruction (pedagogical significance of inductive methods); the fixing and utilizing of knowledge through concrete application; practical applications of the foregoing through model exercises prepared by the students.

Logic. This study lies at the basis of the natural or logical organization of the studies of the curriculum. Any given topic in arithmetic, for example, is logically preceded and followed by others. Logic also gives a key to the deeper or philosophical discussion of the problems of mind. Some of its topics are as follows:

Principles of logic; conditions of valid thinking; forms of arguments; fallacies and their classification; inductive and deductive reasoning; principles and methods of investigation; practical applications of logic in the construction of arguments, in the detection and answer of fallacies, and the formation of the habits of thinking and common judgment of life.

Special Methods. This work includes a full pedagogical treatment of each of the common branches, as reading, language, arithmetic, grammar, history, drawing, etc. It seeks to answer such questions as the following: What are the essential or governing ideas in this subject? What is the natural order of their development? What phases of this natural or logical development correspond to the various phases in the development of the child; or, what would an ideal course of study show in each grade, so far as the subject is concerned? How must the general laws of instruction be applied to this special subject? What is the history of this study in school education, as to its introduction and development, as to the development of methods of teaching it? What is the specific educational value of this subject in the discipline of mind and in practical usefulness? What is its relation to the other subjects of the curriculum?

Mental Science. This study embraces largely the topics found in educational psychology, but is treated in a broader, less technical manner. Its bearing on ethics, aesthetics, and the formation of moral character is emphasized. It serves also as an important part of the preparation for the higher philosophical study.

School Supervision. Historical view of school supervision in the United States; character of school supervision; state, county and city

supervision; the city superintendent of schools, his relation to pupils, to teachers; gradation and course of study; promotions; relation of superintendent to parents, to physical and moral training of pupils, to government and discipline; his relation to the board of education, to agencies for the improvement of teachers.

History of Education. The history of education traces the growth of educational ideals, showing how these are determined by national institutions and modes of thought, and also how these ideals in turn help to shape the further development of national life. Special attention is given to the growth of modern pedagogical doctrines, notably those of Comenius, Rousseau, Pestalozzi, Herbart and Froebel on the continent, and those of Locke, Bain, and Spencer in England. The central and determining principle of each educational movement or system is sought and carried to its logical conclusion. These principles are then articulated and exhibited in their organic development. The history of education is thus no longer a chaos of unrelated or repeated facts, but an organic whole, capable of being understood and remembered. In addition to this organic general view, each of the important notions of education, such as the principles of right methods, is traced in its development and transformations through the modern systems of education.

Philosophy of Education.—The basis of this work will be Bain's "Education as a Science," and Rosenkranz's "Philosophy of Education."

Introduction to Philosophy.—Nature and problems of philosophy. Relation of philosophy to the particular sciences. Presuppositions of experience; space, time, ideas of cause, effect, self-cause or self-activity; dependent and independent beings; dogmatism, scepticism, and criticism; theory of knowledge; philosophy of nature and of mind, ethics; aesthetics; tendencies and schools in philosophy.

History of Philosophy.—Rise of the spiritual view of the world, Anaxagoras, the Sophists, Socrates, Plato, Logic and Metaphysics of Aristotle, Descartes, Spinoza, Locke, Hume, Condillac, Leibnitz, Wolff, Berkeley, Kant.

COURSE IN PHILOSOPHY AND PEDAGOGY,

Leading to the Degree of B.L.

The first and second years of this course may be those of either of the other courses in the College of Literature and Science.

THIRD YEAR.

1. Educational Pyschology; Chemistry; Botany.
2. Science of Instruction; Logic; Botany.
3. Special Methods; Modern History; Astronomy or Geology.

FOURTH YEAR.

1. School Supervision; Mental Science; Physiology.
2. History of Education; Introduction to Philosophy; Zoölogy.
3. Philosophy of Education; History of Philosophy; Political Economy.

ADDITIONAL COURSES.

NOT INCLUDED IN THE FOUR COLLEGES.

COURSE IN MILITARY SCIENCE.

PROFESSOR ELBRIDGE R. HILLS,

1ST LIEUTENANT 5TH ARTILLERY, U.S.A.

By the law of congress, and of the state, the University is required to teach military tactics to its students. All able-bodied male students of the preparatory year and of college classes of the first, second, and third years are enrolled in the companies of the University battalion, and receive instruction in the following military exercises:

School of the Soldier; Manual of Arms.
School of the Company; Movements by Platoons, Firings, etc.
School of the Battalion; Ployment and Deployment of close Columns.
Battalion and Company Skirmish Drill; Bugle Calls.
Bayonet Fencing; Target Practice.
Guard and Picket Duties of Sentinels.

CLASS IN MILITARY SCIENCE.

Classes are taught in military science and tactics, as far as is requisite for officers of the line. At the end of the junior year each member of the class is required to present an essay upon some military subject. This is retained in the library of the department. From these classes are selected the officers of the several companies, for which they act as instructors. The military instruction is under the charge of Lieut. Elbridge R. Hills, a graduate of the U. S. Military Academy, and an officer of the regular army of the United States. A full supply of arms and ammunition is furnished by the war department, including 300 cadet rifles and accoutrements, and two pieces of field artillery. Ammunition is furnished for practice and target firing, and for artillery use.

No student is eligible to the military class until he has reached the third term of the freshman year, nor unless he is in good standing in all his studies. The course of instruction is confined strictly to two years.

No student will be permitted to retain a command who does not maintain a good standing in conduct and scholarship.

The instruction and class exercises occupy about three hours each week, arranged, as far as possible, so as not to interfere with any other course of study. Students must be careful, however, to ascertain, before entering the military class, that the proper studies and exercises of their chosen course will not be interfered with.

Commissions.—The Governor of the state is accustomed to commission as captains, by brevet, in the state militia, such graduates of the University as have completed the studies of the military classes and have obtained the requisite experience in command in the University battalion. In order to obtain the commission the student must be approved by the Faculty and pass, satisfactorily, an examination in military science and tactics before a committee appointed by the Faculty of the University. It is expected that in order to get the required experience in command, the members of the military class of the third or junior year will serve as commissioned officers of the several companies of the battalion.

The standings obtained in military science are not counted in the number required for graduation or class standing; the commission above named being deemed sufficient reward for proficiency in this department.

University Uniform.—Under the authority of the acts of incorporation, the trustees have prescribed that all male students, after the first term of their attendance, shall wear the University uniform. The University cap is to be worn from the first. The uniform of privates consists of a suit and a cap of cadet gray cloth. Students can procure them ready made on their arrival here. The University cap is ornamented in front with the initials, U. of I., surrounded by a wreath. The uniform of commissioned officers consists of a dark blue coat and vest and trousers of lighter blue, the whole being similar to the fatigue dress of officers in the United States army. Students will always wear their uniforms on parade, but in their rooms and at recitations may wear other clothing.

The University Cornet Band is composed of students who, while members of the band, are excused from drill. Instruments and music are furnished by the University, and the band plays at drill and other college exercises.

COURSE IN MILITARY SCIENCE.

FIRST YEAR.

1. School of the Soldier and Company; Bayonet Fencing.

SECOND YEAR.

1. School of Battalion; Skirmish Drill.
2. Ceremonies and Reviews; Military Signaling; Sword Fencing.
3. Guard, Outpost, and Picket Duty; Military Signaling; Sword Fencing.

THIRD YEAR.

1. Military Administration; Reports and Returns; Theory of Fire Arms; Target Practice; Artillery Drill.
2. Organization of Armies; Art of War; Field Fortifications; Artillery Drill.

GYMNASIUM.

The military hall is furnished with a full set of gymnastic apparatus, and classes in gymnastic exercises, for both ladies and gentlemen, are organized throughout the year, under the tuition of a competent instructor. Fee, 50 cents per term.

COURSE IN ART AND DESIGN.

PROFESSOR FRANK F. FREDERICK.

This course is to subserve a two-fold purpose. 1. It affords to the students of the several colleges the opportunity to acquire such a knowledge of free-hand drawing as their chosen courses may require. 2. It offers to such as have a talent or taste for art the best facilities for pursuing studies in industrial designing or other branches of fine art. Schools of design, in Europe and in this country, have been found important aids to the higher manufactures, adding to the beauty of fabrics, and to the skill and taste of workmen.

The increased interest in the decorative arts, and in the manufactures which they require, has added new importance to the study of drawing and designing. It is the purpose to keep this school of design abreast with the best movements in this direction.

COURSE OF INSTRUCTION—ELEMENTARY CLASS.

REQUIRED WORK.

In Outline. Group of geometric solids; group of common objects; ornament from cast; detail of human figure from cast.

Light and Shade. In charcoal or French sauce: group of geometric solids; group of common objects; cast of ornament. In water-color, sepia: group of common objects; cast of ornament.

Design. An original exercise showing principles and methods; another employing color; an original practical design.

PAINTING AND MODELING CLASS.

REQUIRED WORK. FIRST YEAR.

Painting in Water Color. Flower and foliage from nature; group as a study for composition and color.

Drawings. Study of antique figure from cast; anatomical details.

Design. Details comprising the human, animal, plant, and insect form, for the purpose of design; monograph of the ancient, mediæval, and modern styles of ornament; an original practical design in color; an original practical design to be executed in the room.

Modeling. Historic ornament from cast; study of ornament from flat copy.

Casting. Casts of the two preceding: from nature of arm, hand, or foot; also from nature of foliage, fruit, or vegetable.

Perspective. Building from photograph, rendered in line; same from nature; building shaded in sepia; landscape from nature in line or water-color.

REQUIRED WORK. SECOND YEAR.

Painting in Oil. Study in monochrome from still life; group as study for composition and color.

Drawing. Study of antique figure from cast; portrait head from nature.

Modeling. Bas-relief from antique figure; anatomical rendering from antique figure; bust, life size, from the antique; portrait head from nature in round or relief.

Casting. Cast from a piece-mould, sulphur-mould, and gelatine-mould.

Design. An original practical design for the flat or round.

ADVANCED CLASS.

Every opportunity will be offered to perfect the student in his chosen branch of study.

As a preparation for entering the course in art and design, the study of plane geometry and projection drawing is recommended.

Topics for reading upon art subjects are given weekly.

Detailed studies and sketches, such as are necessary to the successful rendering of things, will be required outside of the regular exercises.

For admission to the advanced classes the student must show proficiency in preliminary work.

The authorities of the University have provided that persons not connected with the institution may join the drawing and painting classes on very moderate terms.

COURSE IN RHETORIC AND ORATORY.

All students are required to participate in the exercises of this course. Such an outline of instruction in composition and oratory is provided as makes it probable that all who complete it faithfully will be able to express their thoughts, both with voice and pen, in a clear, intelligent manner, and without affectation or embarrassment.

The required theme work extends over the first two years of the course, the remaining two being given to the art of oratory, including the principles of delivery.

The number of themes from freshmen is eight, and from sophomores twelve, and each paper, after correction, is returned to the student to be re-written. For composition the classes are divided into sections of about twenty, which meet weekly. At these meetings, questions of students are answered, the faults and merits of the essays of the preceding week are pointed out, and subjects assigned for the next week. One lecture each term is given by the professor to the whole class, on the kind of writing involved in the next twelve weeks; as narration, description, argument, etc.

In oratory, the classes are also divided into sections. A critical analysis is made of some of the master-pieces of the great orators of England and America. The life and character of the orator, the circumstances that called forth the oration, his object in pronouncing it, are considered, and a study is made of his diction, sentences, paragraphs, figures of speech, etc. In addition, selections from the oration are as-

signed to the members of the class, which, after being well committed to memory, are carefully prepared, under the supervision of the instructor, for delivery in the presence of the whole class.

Each member of the senior class is required to prepare a suitable oration or essay and to deliver it before the Faculty and students in the chapel.

MUSIC.

CLARA MAUD KIMBALL.

Music constitutes no part of any University course of studies, and is therefore not provided by the Trustees. But, as many students desire instruction in music, competent teachers are selected by the Trustees, and rooms are set apart for instruction.

TUITION.

Instruction, term of ten weeks—2 lessons a week	$10 00
For a term of ten weeks—one lesson a week	6 00
Practice on piano, one hour daily, per term	2 00

The teacher of Vocal Music and Voice Culture follows the Italian method, giving individual instruction.

TERMS.

Ten weeks—two lessons a week	$12 00
Ten weeks— one lesson a week	7 00

No deduction on account of absence in either course, except in case of protracted illness.

Special students in music will also be charged the regular term fee charged other students of the University.

PRIZES AND SCHOLARSHIPS.

THE CONKLIN ORATORICAL PRIZES.

Mr. R. R. Conklin, an alumnus of the University, has offered two prizes, of $60 and $40, respectively, for original orations from Juniors, to be pronounced at such time as the Faculty may appoint during the week of commencement. Competition is open to such as are full members of the junior class. From the orations presented on or before the first day of May preceding, a number, not to exceed ten, to be selected by the Faculty, will be presented on the platform, and to the first and second best, as may be determined by judges, the prizes will be awarded.

THE HAZLETON PRIZE MEDAL.

Capt. W. C. Hazleton has provided a medal, of beautiful and artistic design, which is to be awarded at a competitive drill to be held near the close of the year, to the best drilled student. Each competitor must have been in attendance at the University for at least sixteen weeks of the current college year; must not have had more than four unexcused absences from drill; must present himself for competition in full uniform.

The award will be made on the following points:

1. Erectness of carriage, military appearance and neatness.
2. Execution of the school of the soldier without arms.
3. Manual of arms with and without numbers.

The successful competitor will receive a certificate setting forth the facts, and may wear the medal until the 15th of May following, when it will be returned for the next competition.

THE HARRIET ABBOT-BIRCHMORE PRIZE.

This prize is offered to stimulate accurate study of the changes produced in articles of human food. The subject for which a prize is offered in 1892 is "The identification of any hitherto undetermined poison developed in human food, and the isolation of the cause." The prize offered, a set of re-agents for the micro-technique. The contestants, the pupils in the Botanical Laboratory of the University of Illinois.

THE HONORARY SCHOLARSHIPS.

Provision has been made for one honorary scholarship for each county in the state. The holder of the scholarship may attend the University for four years, under proper regulations, free of charge for tuition or incidental expenses. The total value of this scholarship is $90.

Several of these scholarships are already occupied. The vacancies in other counties will be filled as follows:

Examinations are to be held in the several counties, under the supervision of the county superintendents thereof, on the second Friday and Saturday of June, at such places as the superintendents may select. Candidates for the examination must be approved by the superintendents in the common English branches. Questions will be furnished from the University, and the answers, in writing, will be sent to the University for judgment. The scholarship will be awarded to the candidate who passes the best examination, provided he has a standing in each subject of not less than 75, and an average standing on all the subjects of not less than 80 per cent.

Each pupil who enters the examination may choose whether he will be examined to enter upon a technical course in Colleges of Agriculture, Engineering, or Natural Science, or a literary course in the College of Literature and Science.

In the first case, the subjects of his examination will be algebra, geometry, physiology, botany, natural philosophy, and English rhetoric.

In the second case, the subjects will be algebra, geometry, botany or natural philosophy, four books of Cæsar, six orations of Cicero, and six books of the Æneid.

The two classes of examinations are intended to be as nearly equivalent as possible, and to conform to the requirements stated under the head, *Examinations for Admission*, p. 79. It is essential that the examinations in the counties be held at the time named above, publicly, and with reasonable notice; requests for special or private examinations can not be considered.

PREPARATORY CLASSES.

To meet an urgent demand, the Trustees have temporarily provided for teaching the preparatory studies lying between the work of the Elementary schools and the University. Candidates for these classes must be not less than fifteen years old. They must pass satisfactory examinations in arithmetic, geography, English grammar, and history of the United States.

Students in the preparatory studies are not matriculated as members of the University. They pay no entrance fee, but are charged a tuition fee of five dollars a term, and the incidental fee of seven and a half dollars a term. They have all the privileges of the library, and of the public lectures, and are required to drill.

The studies taught in the preliminary year are as follows:

FOR COLLEGES OF AGRICULTURE, ENGINEERING, AND NATURAL SCIENCE.

First Term.—Algebra—(Wells's). Fundamental rules; factoring; common divisors and multiples; powers and roots; calculus of radicals; simple equations; proportion and progression. *Physiology.*—(Cutter's.) *Natural Philosophy.*—(Norton's.)

Second Term.—Algebra.—Quadratic equations, etc. *Geometry.*—(Wells's) Plane geometry, lines, circumferences, angles, polygons, as far as equality. *English.*—Elements of composition. (Clark's.) Orthoepy and word analysis. (Introduction to Webster's Academic Dictionary.)

Third Term.—Geometry completed, including solid geometry and the sphere. *English*, as in the second term, with addition of Goldsmith's Traveler and Deserted Village, read for analysis. *Botany.*—Gray's Lessons and Manual.

FOR COURSES IN THE COLLEGE OF LITERATURE AND SCIENCE, EXCEPT THE COURSE IN ANCIENT LANGUAGES.

First Term.—Algebra as above. *Physiology. Natural Philosophy. Latin.*—Cicero's Orations. Prose composition.

Second Term—Algebra and Geometry, as above. *Latin.*—Æneid. Prose composition.

Third Term.—Geometry, as above. *Botany. Latin.*—Æneid. Prose composition.

FOR COURSE IN ANCIENT LANGUAGES.

First Term.—Algebra, as above. *Latin.*—Cicero's orations. Prose composition. *Greek.*—Grammar and Reader.

Second Term.—Algebra and Geometry, as above given. *Latin.*—Æneid. Prose composition. *Greek.*—Anabasis. Prose composition.

Third Term.—Geometry completed. *Latin.*—Æneid. Prose composition. *Greek.*—Anabasis. Prose composition.

SOCIETIES.

The Literary Societies have from the opening of the University enjoyed its fostering care.

The ADELPHIC, PHILOMATHEAN, and ACADEMY societies, for men, and the ALETHENAI, for women, occupy spacious halls, which the members have furnished and decorated with taste and elegance. Meetings are held Friday evenings throughout term time, are well attended, and are maintained with unflagging interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

The YOUNG MEN'S and YOUNG WOMEN'S CHRISTIAN ASSOCIATIONS are both active and useful.

Special organizations unite the students of NATURAL HISTORY, of CIVIL ENGINEERING, of MECHANICAL ENGINEERING, of ARCHITECTURE, of AGRICULTURE, and of CHEMISTRY, and in ATHLETICS.

REGULATIONS AND ADMINISTRATION.

ADMISSION.

Examinations of candidates for admission to the University, or to any of its departments, are held at the University itself, on the two days previous to the opening of each term.

Applicants must be at least fifteen years of age, must pass the required examinations, and must pay the prescribed fees. No distinction is made in regard to sex, nativity, color, or place of residence. Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is very much better to begin upon the first collegiate day in September, when a large number of the classes are organized, several of them to continue during the year. Entrance, however, may usually be made satisfactorily at the beginning of the winter and spring terms.

Entrance Examinations.—The subjects upon which examinations for admission are held are as enumerated below:

FOR THE COLLEGES OF AGRICULTURE, ENGINEERING AND NATURAL SCIENCE.

Arithmetic; English Grammar; Geography; History of the United States; Algebra, including equations of the second degree and the calculus of radical quantities; Geometry, plane and solid; Physiology; Botany; Natural Philosophy; Rhetoric and Composition.

The text books mentioned in course of study for the preparatory classes, page 77, may be taken as an indication of the requirements in these studies. Any real equivalents for the books named are accepted.

FOR COLLEGE OF LITERATURE AND SCIENCE.

For the courses in English and Science, Latin and Science, and Philosophy and Pedagogy, the same as the above, except the Rhetoric and Composition and with the addition of the following Latin:

Four books of Cæsar's Commentaries, six orations of Cicero, six books of Vergil's Æneid, with scansion of hexameter verse and the translation of English sentences into Latin prose, based on the portions of Cæsar and Cicero above named. This will necessitate a thorough knowledge of the etymology and syntax of Latin grammar.

Harkness's or Allen and Greenough's grammar and Winchell's (Bingham's) Latin Prose Composition are recommended.

Real equivalents for any of the above mentioned works will be accepted.

The Roman method of pronunciation is recommended.

For the Course in Ancient Languages, the same as the first list, except the omission of Rhetoric and Composition, Physiology, Botany, and Natural Philosophy, and with the addition of the Latin described and Greek as follows:

Greek Grammar (Goodwin's or Hadley's), Greek Prose Composition (Jones's), and four books of Xenophon's Anabasis. Writing Greek with the accents will be required.

The so-called Continental sounds of the vowels and diphthongs and pronunciation according to accent are recommended.

County Superintendents' Certificates.—To prevent loss to those who are not prepared to enter the University, but might come, hoping to pass the examinations for admission, the following arrangement has been made:

County Superintendents of schools will be furnished with questions and instructions for the examination of candidates in the four common branches, arithmetic, geography, English grammar, and history of the United States; applicants who pass creditably will, when they present the superintendent's certificate to that effect, be admitted to the classes of the preliminary year.

Persons who hold teacher's certificates from county superintendents will be admitted to the preliminary class without further examination.

Accredited High Schools.—The Faculty, after personal examination, appoints accredited high schools, whose graduates may be admitted to the University without further examination within one year after date of their graduation. These must be schools of first rate character, whose courses of instruction include all the studies required for admission to some one of the colleges of the University. On application, a member of the Faculty is sent to examine the school making application, as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. If the report is favorable, the name of the school is entered in the published list of high schools accredited by the University. The graduates of these schools are admitted to such of the colleges as their studies may have prepared them to enter. The appointment continues as long as the work of the school is found satisfactory. Annual reports are asked from these schools.

The accredited schools whose graduates are admitted to any of the colleges of the University are the public high schools in

Aurora, East.	Charleston.	Decatur.
Aurora, West.	Chicago, North.	Dixon.
Bloomington.	Chicago, South.	Evanston.
Cairo.	Chicago, West.	Freeport.
Champaign.	Danville.	Galena.

Hyde Park.
Jacksonville.
Jerseyville.
Kewanee.
Lake View.
Lincoln.
Mattoon.
Mendota.
Moline.
Oak Park.
Ottawa.
Paris.
Peoria.
Princeton.
Rockford.
Rock Island.
Springfield.
Streator.
Tuscola.
Urbana.

Also the high school of the Normal University, at Normal.

The accredited schools whose graduates are admitted to the College of Engineering, of Agriculture, or of Natural Science are the public high schools in

Camp Point.
Farmer City.
Gibson City.
Kankakee.
La Salle.
Marengo.
Monticello.
Pekin.
Peru.
Pittsfield.
Polo.
Robinson.
Rochelle.
Rossville.
Shelbyville.
Sheldon.
Sterling.
Sycamore.
Warren.
Washington.
Watseka.
Waverly.
Yorkville.

Also the Chicago Manual Training School.

CHOICE OF STUDIES.

From the outset, the University has permitted great freedom in the selection of studies. It is, however, necessarily required: that the student shall be thoroughly prepared to enter and to keep pace with the classes in the chosen studies, and that he shall take these studies in the terms in which they are taught. *Candidates for a degree must take the course of study prescribed for that degree.* But in the Colleges of Agriculture, Natural Science, and Literature and Science, other University drawing will be accepted for an equivalent amount of free-hand drawing.

Each student is expected to have three distinct studies, affording three class exercises each day. On special request, the Faculty may allow less or more.

No change in studies may be made after the beginning of a term without permission of the Faculty.

Due care will be taken to prevent, as far as possible, all abuse of the liberty of choice. Students failing to pass satisfactory examinations in their chosen studies will not be permitted to remain and take other studies without a vote of the Faculty.

REQUIRED STUDIES.

To secure the diffusion of the sciences relating to the great industries, the state legislature, in 1873, prescribed that each student should be taught some of those sciences.

The Trustees accordingly require that each student shall take, each term, one study, at least, from the following list:

Agricultural Chemistry.
Agricultural Engineering and Architecture.
Analytical Mechanics.
Anatomy and Physiology.
Animal Husbandry.
Architectural Drawing and Designing.
Astronomy.
Botany.
Bridges.
Chemistry.
Dynamics.
Electric Machinery.
Elements of Agriculture.
Elements of Horticulture.
Entomology.
Esthetics of Architecture.
Estimates.
Free-Hand Drawing.
Geodesy.
Geology.
Graphical Statics.
Heat Engines.
History of Agriculture.
History of Architecture.
Hydraulic Engines and Wind Wheels.
Hydraulics.
Landscape Gardening.
Logic.
Machine Drawing.
Masonry Construction.
Mathematics.
Mechanism.
Mental Science.
Metallurgy.
Military Science.
Mill Work.
Mine Administration.
Mine Attack.
Mineralogy.
Mining Engineering.
Physics.
Physiography.
Political Economy.
Railroad Engineering.
Resistance of Materials.
Rural Economy.
Sanitary Construction.
Stone, Brick and Metal Construction.
Surveying.
Vegetable Physiology.
Veterinary Science.
Wood Construction.
Zoölogy.

TERM EXAMINATIONS.

Written examinations are held at the close of each term or oftener, and whenever any study has been finally completed. Any student failing to answer correctly 75 per cent. of the questions proposed, loses all credit for that study, and is precluded from proceeding with any other studies without special permission.

A record is kept of each student's term work and standing, and from this his final certificate of graduation is made up.

A statement of the scholarship and conduct of each student will be sent to his parent or guardian as soon as may be after the end of each term.

DEGREES AND CERTIFICATES.

The law provides that, "on recommendation of the Faculty, the Trustees may authorize the Regent, as president of the University, to issue diplomas to such persons as shall have completed satisfactorily the required studies, and sustained the examination therein, conferring such literary and scientific degrees as are usually conferred by Universities for similar or equivalent courses of studies, or such as the Trustees may deem appropriate." *Approved May 11, 1877.*

In accordance with the law, the following system of degrees has been adopted by the University:

1. All studies will remain, as heretofore, free. Each student may choose and pursue such studies as he may desire, subject only to such conditions as to preparation, times of study and number of studies, as may be necessary to secure efficiency in classes and economy in teaching.

2. But students who wish to be candidates for any degree must complete fully the course of studies prescribed for such degree, and must present an accepted thesis.

3. Students not candidates for any degree will be enrolled as special students, and will receive at the close of their attendance, if not less than a year, the certificates provided by law, with statements of work done and credits attained. Credits from other institutions may not be entered upon such certificates.

The form of graduation with a "full certificate" will be discontinued after the commencement of 1891.

4. It is designed that the requirements for all the bachelor's degrees shall be, as nearly as possible, equal in amount and value.

5. The Degree of Bachelor of Science, B.S., will be given to those who complete either of the courses of study in the College of Engineering, Agriculture, or Natural Science. The name of the course will be inserted after the degree.

6. The Degree of Bachelor of Letters, B.L., will be given to those who complete the course of English and Science, Latin and Science, or of Philosophy and Pedagogy.

7. The Degree of Bachelor of Arts, B.A., will be given to those who complete the course in Ancient Languages.

8. The Master's Degrees, M.S., M.L., and M.A., and the equivalent degrees of C.E., M.E., etc., will be given to those only who have

pursued a year of prescribed post-graduate studies, and passed examinations thereon, or after a term of three years' successful practice. In either case an accepted thesis will be required.

GENERAL DIRECTIONS TO STUDENTS.

Young men or women desiring a liberal education, and living at a distance from a college or university, are often puzzled to understand precisely what they will be required to know and to do in order to gain admission. To such these words are addressed:

1. Notice that a college or university (which is properly a collection of colleges) is designed for the higher education only, and not for the study of common branches. None of the common branches, such as arithmetic, geography, English grammar, reading and spelling, are taught in this University. These all must be finished before you come.

2. In order to pursue profitably the true college studies, and to keep pace with the classes, you must be ready to pass a strict examination in the common branches just mentioned, and in certain other preparatory studies, differing with the different colleges of the University. (See p. 79.)

3. If well prepared only in the common branches above named, you may be admitted, not to the college, but to the preparatory classes, in which you will study the other preparatory studies for admission to college. (See p. 77.) All preparatory studies must be completed before you can be admitted, as a matriculated student, to any college class.

4. All college studies are arranged in regular courses, in which each term's work is designed to prepare for the next. You should enter at the beginning of the college year, in September. If unable to enter at that time, you may enter at any later time by making up the studies already passed over by the class.

5. Enter college with the purpose of going through, and make your course *regular as far as you go.* If obliged to leave before you have finished the course, you will have done the best thing for yourself in the meantime; while if you remain, the regular course is in nine cases out of ten the most useful and effective.

Students desiring only a winter's schooling should go to some high school.

LABOR.

Labor is furnished as far as possible to all who desire. It is classified into educational and remunerative labor.

Educational labor is designed as practical instruction, and constitutes

a part of the course in several schools. Students are credited with their proficiency in it as in other studies. Nothing is paid for it.

Remunerative labor is prosecuted for its products, and students are paid what their work is worth. The usual rate paid for ordinary farm, garden, and shop labor is *ten cents* per hour. Students of sufficient experience may be allowed to work by the piece or job, and thus by diligence or skill secure more pay.

Some students who have the requisite *skill, industry, and economy*, pay their entire expenses by their labor; but, in general, young men cannot count upon doing this at first, without a capital to begin with, either of skill or of money, to serve them till a degree of skill is acquired. As the number of students increases, it is found more and more difficult to furnish the labor needed, and students cannot count upon finding employment.

BOARD.

The University does not furnish board. There is no general provision for boarding, but there is an abundance of suitable private places in Urbana and Champaign within a reasonable distance of the University, and easily accessible by electric railways, where students can obtain either table board or board and rooms, with the advantages of the family circle. Boarding clubs are formed, at which the cost of meals is about two and a half dollars per week. Some students prepare their own meals, thus considerably reducing expenses.

The Business Agent and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

EXPENSES.

THE TUITION IS FREE in all the University classes.

THE MATRICULATION FEE entitles the student to membership in the University until he completes his studies, and must be paid before he enters.

Amount... ....$10.00

THE TERM FEE for incidental expenses is for each student........ 7.50

Each student working in laboratories, or in the draughting or engineering classes, is required to make a deposit varying from 50 cents to $10, to pay for chemicals and apparatus used, and for any breakages or damages.

ALL BILLS due the University *must be paid before the student can enter classes.*

The following are estimated maximum and minimum annual expenses, exclusive of books and clothing, of a residence of thirty-six weeks at the University:

	MIN.	MAX.
Term fees	$ 22.50	$ 22.50
Room rent for each student	18 00	48.00
Table board in boarding houses and clubs	90 00	126.00
Fuel and light	10 00	15.00
Washing at 60 cents per dozen	9.00	18.00
Total amount	$149.50	$229 50
Board and room in private houses, per week	4.00	6.00

FEES IN THE PRELIMINARY YEAR, OR IN THE BUILDERS' COURSE, OR THE FARMERS' JUNIOR COURSE.

Tuition per term	$5.00
Incidental fee, per term	7.50

SPECIAL FEES.

For Instrumental Music, for 20 lessons	$10.00
For Painting, or Drawing to special students	10 00
Matriculation fee	10.00
Graduation fee	5 00

CAUTION TO PARENTS—STUDENTS' FUNDS.

The Business Agent will receive on deposit any funds parents may intrust to him to meet the expenses of their sons. *No greater error can be committed than to send boys from home with large amounts of spending money*, without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money. Students have little real need for money, beyond that required for fees, board bills and books. The attention of parents and guardians is earnestly requested to this matter, and especially in the case of those students who are under 20 years of age.

LIST OF STUDENTS.

RESIDENT GRADUATES.

Clark, Edith Louisa,	Urbana.
Shamel, Charles H., B.S.,	Willey.
Detmer, Frederika, B.S., (Univ. of Ohio.)	Columbus, Ohio.

SENIOR CLASS.

Barclay, Thomas,	*Plainfield,*	Chemistry.
Bouton, Charles Sherman,	*Hyde Park,*	Chemistry.
Boyd, Willard Albion,	*Lewistown,*	Mechanical Engineering.
Braucher, Ernest Newton,	*Lincoln,*	Architecture.
Bunton, Fred Lyle,	*Kewanee,*	Mechanical Engineering.
Chester, Dick Hubert,	*Champaign,*	Chemistry.
Chester, John Needels,	*Champaign,*	Civil Engineering.
Clarke, Edwin Besançon,	*Quincy,*	Architecture and Mil.
Clarke, Frederic Woodruff,	*Quincy,*	Architecture and Mil.
Eidmann, Edward Charles,	*Mascoutah,*	Civil Engineering.
Eno, Frank Harvey,	*Pomona, Cal.,*	Civil Eng. and Mil.
Fischer, Lawrence,	*Oregon,*	Architecture.
Frahm, Hans,	*Tuscola,*	Eng. and Mod. Lang.
Frederickson, John Henry,	*Champaign,*	Civil Engineering.
French, Ransford Morton,	*Pana,*	Architecture.
Gardner, Frank Duane,	*Gilman,*	Agriculture.
Gibson, Charles,	*South Grove,*	Civil Engineering.
Green, Thomas Stephen,	*Jacksonville,*	Natural History.
Harris, Jay Tarven,	*Champaign,*	Civil Engineering.
Harvey, Alfred Ernest,	*Paris,*	Civil Eng. and Mil.
Hay, Walter Morris,	*Sandwich,*	Civil Engineering.
Hobbs, Glen Moody,	*Yorkville,*	Eng. and Mod. Lang.
Howorth, Thomas James,	*Chester,*	Ancient Languages.
McClure, Ora Deal,	*Gibson City,*	Mech. Eng. and Mil.
McCormick, Wirt,	*Mahomet,*	Eng. and Mod. Lang.
Maue, August,	*Mokena,*	Eng. and Mod. Lang.
Mitchell, Charles Jacob,	*Fulton,*	Civil Engineering.
Peabody, Lorin William,	*Urbana,*	Mechanical Engineering.
Powell, John Henderson,	*Shawneetown,*	Civil Engineering.

Richart, Frederic William,	*Fredonia,*	Mechanical Engineering.
Shamel, Clarence Albert,	*Willey,*	Agriculture.
Shattuck, Walter Francis,	*Champaign,*	Architecture.
Smolt, Franklin Oscar,	*Paw Paw,*	Chemistry and Mil.
Terrill, Joseph Samuel,	*Urbana,*	Natural History.
Vail, Charles Davis,	*Lone Tree,*	Civil Eng. and Mil.
Wallace, Ross Strawn,	*Pontiac,*	Mech. Eng. and Mil.
Young, Charles B.,	*Aurora,*	Architecture.
Beach, Laura Mae,	*Champaign,*	Natural History.
Broaddus, Alice Virginia,	*Urbana,*	Natural History.
Butterfield, Helen Eliza,	*Champaign,*	Eng. and Mod. Lang.
Carson, Annie,	*Urbana,*	Eng. and Mod. Lang.
Darby, Nellie Margaret,	*Urbana,*	Eng. and Mod. Lang.
Heller, Opal Beatrice,	*Urbana,*	Eng. and Mod. Lang.
Jones, Isabel Eliza,	*Champaign,*	Natural History.
Jones, Mabel,	*Champaign,*	Eng. and Mod. Lang.
Myers, Clara,	*Newport, Ind.,*	Eng. and Mod. Lang.
Paine, Sarah Mariena,	*Orizaba,*	Natural History.
Shattuck, Anna Fletcher,	*Champaign,*	Eng. and Mod. Lang.
Seibert, Emma Effie,	*Champaign,*	Natural History.

JUNIOR CLASS.

*Baker, John Phœnix,	*Parkersburg, Iowa,*	Civ. Engineering.
Barker, John King,	*Three Rivers, Mass.,*	C. E. and Mil.
Burrows, Parke Tunis,	*Davenport, Iowa,*	Arch. and Mil.
Carnahan, Franklin Gregory,	*Champaign,*	Ancient Languages.
Crissey, John Waterbury,	*Chester,*	Civil Engineering.
Cross, Charles William,	*Kewanee,*	Architecture.
Forbes, Robert H.,	*Princeton,*	Chemistry.
Foster, Winslow Howard,	*Chicago,*	Mechanical Engineering.
Foster, Zebulon,	*Armstrong,*	Civil Engineering.
Funston, Edmund B.,	*Champaign,*	Architecture.
Gates, Andrew Wallace,	*Earlville,*	Civil Engineering.
*Gulick, Edward Everett,	*Champaign,*	Eng. and Mod. Lang.
Gulick, Joseph Piper,	*Champaign,*	Eng. and Mod. Lang.
Gunn, Charles Alexander,	*South Evanston,*	Architecture.
*Hall, Fred Augustus,	*Tonica,*	Chemistry.
Hallinen, Joseph Edward,	*Champaign,*	Natural History.
Harris, William Henry,	*Seymour,*	Civil Engineering.

NOTE.—A star (*) indicates that a student has not secured the full number of credits belonging to the class in which he is enrolled. He may have fallen behind this class, or he may have advanced beyond the class below.

Hart, Ralph Warner,	*Chicago*,	Architecture.
Harvey, Walter Clarence,	*Paris*,	Architecture.
Herrick, Lott Russell,	*Farmer City*,	Eng. and Mod. Lang.
*Hubbell, James Pease,	*Davenport, Iowa*,	Arch. and Mil.
Kiler, Charles A.,	*Urbana*,	Natural History.
Klingelhoefer, William,	*Mascoutah*,	Civil Engineering.
*McCartney, William Priestly,	*Metropolis*,	Chemistry.
McLane, Cyrus D.,	*Allerton, Iowa*,	Architecture.
Martin, William Alexander,	*Chicago*,	Mechanical Engineering.
Mather, Roy Allen,	*Naperville*,	Civil Eng. and Mil.
Miller, William George,	*Chicago*,	Mech. Eng. and Mil.
Morgan, John Barb, Jr.,	*Kinmundy*,	Eng. and Mod. Lang.
Mosier, Jeremiah George,	*Urbana*,	Natural History.
*Morse, Burt,	*Farmington*,	Architecture.
*Nelson, Elnathan Kemper,	*Paris*,	Chemistry.
*Page, John William,	*Waukegan*,	Civil Engineering.
Parkman, Charles Chester,	*Philo*,	Architecture.
*Pasfield, George L.,	*Springfield*,	Eng. and Mod. Lang.
Phillips, James David,	*Englewood*,	Architecture.
Pillsbury, Arthur Low,	*Urbana*,	Civil Eng. and Mil.
Plank, Ulysses Samuel Grant,	*East Lynne, Mo.*,	Natural History.
Pullen, Rome B.,	*Centralia*,	Eng. and Mod. Lang.
Sandford, William Emanuel,	*Kewanee*,	Chemistry.
Scheidenhelm, Edward Lewis,	*Mendota*,	Civil Eng. and Mil.
Siebernes, John Reuben,	*Peoria*,	Civil Engineering.
Snodgrass, William, Jr.,	*Urbana*,	Mechanical Engineering.
Spencer, James Elihu,	*Champaign*,	Civil Engineering.
Steele, James,	*Henry*,	Chemistry and Mil.
Wait, Benjamin Asaph, Jr.,	*Armstrong*,	Civil Engineering.
Williamson, Frank Robert,	*St. Anne*,	Civil Engineering.
*Wood, Robert Alvin,	*Woodburn*,	Mechanical Engineering.
Wright, Royal	*Urbana*,	Eng. and Mod. Lang.

Barber, Alice May,	*La Fox*,	Natural History.
Bennett, Sarah,	*Mattoon*,	Eng. and Mod. Lang.
Boggs, Cassie,	*Urbana*,	Eng. and Mod. Lang.
Hill, Agnes Gale,	*Nevada, Mo.*,	Ancient Languages.
Maxwell, Annele Melissa,	*Champaign*,	Eng. and Mod. Lang.
*Pearman, Myrtle,	*Champaign*,	Natural History.
*Philbrick, Margaret,	*Champaign*,	Natural History.

SOPHOMORE CLASS.

Andrews, Herbert Franklin,	*Piasa,*	Natural History.
Aranda, Ezequiel,	*Allende, Mex.,*	Mechanical Eng.
Bacon, Harlow,	*Huntsville,*	Civil Eng. and Mil.
Bainum, Curtis S.,	*Champaign,*	Architecture.
Barber, William Davis,	*Champaign,*	Civil Engineering.
Bartlett, Henry Emmett,	*Mt. Sterling,*	Civil Engineering.
Behrensmeyer, George Philip,	*Quincy,*	Architecture.
Beuthien, Arnold,	*Durant, Iowa,*	Mechanical Eng.
Bevis, Albon,	*Virginia,*	Architecture.
Blaine, Walter Charles,	*Champaign,*	Chemistry.
Blakesley, George Webster,	*Rock Island,*	Mechanical Eng.
Brown, Frank,	*Monticello,*	Natural History.
Brown, Frank Manear,	*Champaign,*	Architecture.
Brownell, Charles D.,	*Champaign,*	Chemistry and Mil.
Butler, William Tennent,	*Franklin, Ohio,*	Civil Engineering.
Carr, Robert Franklin, Jr.,	*Argenta,*	Chemistry.
Carrick, William,	*Newton,*	Chemistry.
Carter, Charles Willard,	*Aledo,*	Eng. and M. L. and M.
Chambers, William Rock,	*Sadorus,*	Eng. and Mod. Lang.
Coffeen, Fred Goldsmith,	*Champaign,*	Chemistry.
Coffman, Birch David,	*Champaign,*	Natural History.
Cook, James W.,	*Rock Island,*	Mechanical Eng.
Cornell, William Henry,	*Grant Park,*	Mech. Eng. and Mil.
Craig, Edward Chilton,	*Mattoon,*	Eng. and M. L. and Mil.
Crowell, S. Wentworth,	*Oregon,*	English and Mod. Lang.
Danly, Willis Wilson,	*Hennepin,*	Civil Engineering.
Davis, Jonathan Sydney,	*Atwater,*	Architecture and Mil.
Dunaway, W. Alfred,	*Ottawa,*	Architecture.
Earl, Mark Alden,	*Centralia,*	Civil Eng. and Mil.
Gibbs, William David,	*Winchester,*	Agriculture.
Graham, Louis Thomas,	*Pittsfield,*	Natural History.
Graham, William J.,	*Aledo,*	Eng. and M. L. and Mil.
Gulick, Frank,	*Champaign,*	Natural History.
Hall, Lyman,	*Savoy,*	Chemistry.
Hewett, Herbert Edmund,	*Morgan Park,*	Architecture.
Hicks, Preston T.,	*Warren,*	Civil Engineering.
Higgins, Albert Grant,	*Elmwood,*	Architecture.
*Hopkins, Frank Coffeen,	*Buffalo, Wyo.,*	Mechanical Eng.
Hucke, Philip Matthias,	*Mascoutah,*	Natural History.

Huff, George A., Jr.,	*Englewood,*	Chemistry.
Hunt, Edward Everett,	*Urbana,*	Chemistry.
Kellogg, Edwin Frederic,	*Champaign,*	Mechanical Eng.
*Kenaga, William Christopher,	*Kankakee,*	Eng. and Mod. Lang.
Kerns, Shirley Kendrick,	*Champaign,*	Chemistry.
Kinkead, James Albert,	*Earlville,*	Chemistry.
Levy, Alexander,	*Brookfield, Mo.,*	Architecture.
Locke, Alfred,	*La Salle,*	Mech. Eng. and Mil.
Lockwood, Frank Miner,	*Champaign,*	Architecture.
Loomis, Arthur Bates,	*Fulton,*	Civil Engineering.
McClure, Clyde Benjamin,	*Gibson City,*	Civil Engineering.
McGee, Walter Scott,	*Deers,*	Natural History.
McMains, Louis,	*Armstrong,*	Natural History.
*Mann, Jacob Grant,	*Mascoutah,*	Civil Engineering.
Merrifield, Albert Warren,	*Ottawa,*	Civil Engineering.
Metcalf, James David,	*Girard,*	Chemistry.
Millar, Clendon Van Meter,	*Mattoon,*	Chemistry.
Morehouse, Merritt J.,	*Mt. Pleasant, Ia.,*	Architecture.
Needham, James,	*Collinsville,*	Mining Engineering.
Northam, George Abiah,	*Nora,*	Architecture.
Outcalt, Irvin Erastus,	*Champaign,*	Eng. and Mod. Lang.
Paul, William Lewis,	*Peoria,*	Architecture.
Peterson, Adolph B.,	*Chicago,*	Architecture.
Pierce, Charles Ingals,	*Pittsburgh, Pa.,*	Mechanical Eng.
Powers, Will Ambrose,	*Belvidere,*	Chemistry.
Quinn, Edward John,	*La Salle,*	Chemistry.
Rea, Alfred Willemin,	*Urbana,*	Architecture and Mil.
Rowe, William Briggs,	*Ottawa,*	Ancient Languages.
Scott, Donald Gamaliel,	*Champaign,*	Architecture.
Seaman, George Washington,	*Beardstown,*	Mechanical Eng.
Shamel, John Young,	*Willey,*	Agriculture.
Sharpe, Richard W.,	*Tiskilwa,*	Natural History.
Shiga, Shigetsura,	*Tokio, Japan,*	Architecture.
Skielvig, Severin Canute,	*Chicago,*	Architecture.
*Smith, Riley Ellis,	*Blue Mound,*	Mechanical Eng.
Smith, Sherman,	*Leroy,*	Architecture.
Somers, Bert Sheldon,	*San Diego, Cal.,*	Architecture.
Spalding, Fred Milton,	*Gibson City,*	Civil Eng. and Mil.
Steinwedell, William Ernest,	*Quincy,*	Mechanical Engineering.
Stewart, John Truesdale,	*Onarga,*	Civil Eng. and Mil.
Swenson, Bernard Victor,	*Chicago,*	Mechanical Engineering.

*Tackett, William C.,	*Sadorus,*	Natural History.
Thielbar, Frederick John,	*Peoria,*	Architecture.
Thompson, Almon Daniel,	*Gilman,*	Civil Engineering.
Toerring, Christian Jensen,	*Davenport, Iowa,*	Mechanical Eng.
Vial, Robert Clarke,	*Western Springs,*	Civil Engineering.
Walker, Edward Lewis,	*Petersburg,*	Eng. and Mod. Lang.
Wilkinson, Charles E.,	*Argenta,*	Agriculture.
Woodruff, Thomas Tyson,	*Quincy,*	Mechanical Engineering.
Woodworth, Howard Oakley,	*Champaign,*	Natural History.
Young, Orres Ephraim,	*Stonington,*	Eng. and Mod. Lang.
Ayers, Grace,	*Urbana,*	Eng. and Mod. Lang.
Dickinson, Grace Gordon,	*Eureka,*	Eng. and Mod. Lang.
*Gilman, Sadie Goding,	*Warrensburg,*	Eng. and Mod. Lang.
Johnson, Harriette Augusta,	*Rock Island,*	Eng. and Mod. Lang.
Lamkin, Nina Belle,	*Champaign,*	Eng. and Mod. Lang.
*McCormick, Flora,	*Mahomet,*	Eng. and Mod. Lang.
Mann, Estelle,	*Geneva,*	Eng. and Mod. Lang.
*Mathews, Loueva May,	*Urbana,*	Eng. and Mod. Lang.
Peterson, Sophia Mary,	*Champaign,*	Eng. and Mod. Lang.
Yeomans, Frances Anna,	*Danville,*	Eng. and Mod. Lang.

FRESHMAN CLASS.

Arms, Franklin David,	*Chicago,*	Architecture.
Armstrong, James William,	*Toulon,*	Mechanical Engineering.
Armstrong, John Adams,	*Kewanee,*	Mechanical Engineering.
Arnold, Benjamin A.,	*Haldane,*	Natural History.
Atherton, George Henry,	*Streator,*	Civil Engineering.
Atwood, Levi Patten,	*Rockford,*	Civil Engineering.
Babcock, Clyde Leslie,	*Harvard, Neb.,*	Civil Engineering.
Bardill, John Oscar,	*Grantfork,*	Architecture.
Barker, Louis Gilbert,	*Three Rivers, Mass.,*	Mechan. Eng.
Barker, Louis William,	*Sparta,*	Civil Engineering.
Barrett, Edward Ernest,	*Port Byron,*	Civil Engineering.
Bassett, John Benjamin,	*Kewanee,*	Architecture.
Bauer, Otto Frederick,	*Bunker Hill,*	Civil Engineering.
Bauman, Otto,	*Quincy,*	Mechanical Engineering.
Beasley, Harrison Eaton,	*Peoria,*	Civil Engineering.
Benson, Oliver Newkirk,	*Champaign,*	Architecture.

Bing, Edward W.,	*Urbana*,	Chemistry.
Bowen, Herbert L.,	*Kewanee*,	Civil Engineering.
Browning, Howard Allen,	*Elgin*,	Architecture.
Burnham, Robert Davison,	*Champaign*,	Chemistry.
Burt, Henry Jackson,	*Urbana*,	Civil Engineering.
Bush, Arthur Willis,	*Joliet*,	Architecture.
Butterfield, Clarence James,	*Chicago*,	Architecture.
Carpenter, Harvey Irving,	*Champaign*,	Eng. and Mod. Lang.
Chester, Charles Ellsworth,	*Champaign*,	Civil Engineering.
Chester, Oscar Paul,	*Champaign*,	Natural History.
Chipman, Paul,	*Mt. Carmel*,	Civil Engineering.
Clark, Amos Cable,	*Urbana*,	Architecture.
Clark, Cyril Balfour,	*Champaign*,	Mechanical Eng.
Clement, Clarence Adelbert,	*Tiskilwa*,	Civil Engineering.
Cole, Edward Smith,	*Chicago*,	Mechanical Eng.
Cone, George Carroll,	*Farmington*,	Eng. and Mod. Lang.
Crawford, Charles Francis,	*Chicago*,	Civil Engineering.
Crawford, John,	*Jonesboro*,	Mechanical Eng.
Crawford, Thomas,	*Sterling*,	Mechanical Eng.
Danforth, Herman Wenger,	*Washington*,	Civil Engineering.
Dewey, George French,	*Cairo*,	Civil Engineering.
Dickinson, Richard Joy,	*Eureka*,	Civil Engineering.
Eakle, Silas Jackson,	*Forreston*,	Natural History.
Earl, Edward Curtis,	*Centralia*,	Architecture.
Elder, Charles Abbott,	*Topeka, Kas.*,	Architecture.
Engberg, Martin Jonas,	*Chicago*,	Chemistry.
Foote, Ferdinand John,	*McComb City, Miss.*,	Mechan. Eng.
Foster, Alfred Bradford,	*Bradford*,	Civil Engineering.
Fowler, Forrest Stephen,	*Buda*,	Mechanical Engineering.
Fraser, Wilber John,	*Plainfield*,	Architecture.
Frederickson, George,	*Champaign*,	Eng. and Mod. Lang.
Funston, Jesse Grant,	*Champaign*,	Mechanical Eng.
Furber, Willard Allard,	*Carlinville*,	Eng. and Mod. Lang.
Gaut, Robert Eugene,	*Mt. Sterling*,	Civil Engineering.
Greene, Fred William,	*Fayetteville, Ark.*,	Architecture.
Greene, Herbert Miller,	*Peoria*,	Architecture.
Goldschmidt, Otto Emil,	*Davenport, Iowa*,	Mechanical Eng.
Gumbiner, Charles,	*Peoria*,	Civil Engineering.
Hall, Emery Stanford,	*East Lynn*,	Architecture.
Harris, Newton Megrue,	*Champaign*,	Eng. and Mod. Lang.
Hayes, Arthur Howard,	*Litchfield*,	Mechanical Engineering.

Heideman, George Herman,	*Elmhurst,*	Mechanical Engineering.
Hiles, Elmer K.,	*Chicago,*	Mechanical Engineering.
Holbrook, Fred Samuel,	*Englewood,*	Chemistry.
Holmes, Thomas Robert,	*Streator,*	Civil Engineering.
Holston, Benjamin Baldwin,	*Nashville,*	Natural History.
Jansen, Dietrich Herman,	*Pekin,*	Civil Engineering.
Jasper, Thomas,	*Quincy,*	Mechanical Engineering.
Johannsen, Albert Henry,	*State Center, Iowa,*	Architecture.
Johannsen, Oskar August,	*State Center, Iowa,*	Architecture.
Johnson, John Cummins,	*Lacon,*	Mechanical Engineering.
Johnston, Elmer Alward,	*Dewey,*	Mechanical Engineering.
Johnston, Herbert,	*Champaign,*	Natural History.
Johnston, John Stuart,	*Sparta,*	Civil Engineering.
Kennard, Warren George,	*Champaign,*	Chemistry.
Kennedy, John William,	*Collinsville,*	Architecture.
Kerchner, Fred William,	*Belleville,*	Mining Engineering.
Kimball, William Haven,	*Chicago,*	Mechanical Engineering.
Kingman, Louis Shelby,	*Peoria,*	Mechanical Engineering.
Klingel, Louis J.	*Mascoutah,*	Eng. and Mod. Lang.
Klingelhoefer, Charles Benjamin,	*Mascoutah,*	Civil Engineering.
Kramm, Harry,	*Peoria,*	Mechanical Engineering.
Lackey, Henry William,	*Gilman,*	Architecture.
Lambert, John David,	*Quincy,*	Mechanical Engineering.
Leeds, Harmon Gibson,	*Mt. Carmel,*	Mechanical Eng.
Levy, Frank H.	*Urbana,*	Chemistry.
Lischer, Charles,	*Mascoutah,*	Natural History.
Lowry, James Percival,	*Gibson City,*	Architecture.
Lowry, John Albert,	*Gibson City,*	Civil Engineering.
McCaskrin, George Washington,	*Rantoul,*	Chemistry.
McCaskrin, Harry Madison,	*Rantoul,*	Chemistry.
McCloy, Robert Emmet,	*Welton,*	Eng. and Mod. Lang.
McCord, William Hamilton,	*Farmer City,*	Civil Engineering.
Merrick, Harry Austin,	*Chicago,*	Architecture.
Miltimore, Guy,	*Mitchell, S. Dak.,*	Civil Eng.
Morris, Edgar William,	*Onarga,*	Eng. and Mod. Lang.
Morrissey, Daniel C.	*Champaign,*	Eng. and Mod. Lang.
Neal, John Dodge,	*Rantoul,*	Chemistry.
Needham, Frank Mix,	*Hinsdale,*	Mechanical Engineering.
Orr, Edward Ellsworth,	*Quincy,*	Architecture.
Phelps, Albert Charles,	*Lockport,*	Architecture.
Riley, Walter Busey,	*Champaign,*	Eng. and Mod. Lang.

Royer, Joseph William,	*Urbana*,	Architecture.
Roysden, William Ira,	*Champaign*,	Chemistry.
Russell, Charles W.,	*Virginia*,	Ancient Languages.
†Russell, Winfred,	*Champaign*,	Natural History.
Rutledge, John Joseph,	*Alton*,	Mining Engineering.
Scott, William John,	*Champaign*,	Architecture.
Seastone, Charles Victor,	*New Boston*,	Civil Engineering.
Slater, William Frederick,	*Urbana*,	Mechanical Engineering.
Smith, Harry Keys,	*Quincy*,	Mechanical Engineering.
Snider, Harry Holderman,	*Rantoul*,	Mechanical Engineering.
Sperling, Godfrey,	*Dewey*,	Civil Engineering.
Stocker, Edwin Warren,	*Rock Island*,	Architecture.
Stone, Frank Lemuel,	*Port Byron*,	Civil Engineering.
Stowell, Hanson Abbott,	*Anona, Fla.*,	Engineering.
Strauss, William,	*Pittsfield*,	Chemistry.
Strehlow, Oscar Emil,	*Champaign*,	Civil Engineering.
Strout, Frank Asbury,	*Elwood*,	Mechanical Engineering.
Suppiger, Albert Eugene,	*Edwardsville*,	Chemistry.
Swigert, Arthur Woodward,	*Springfield*,	Architecture.
Sy, Albert Philip,	*Altamont*,	Chemistry.
Sylvester, Edmund Lewis,	*Aurora*,	Civil Engineering.
Taft, Frank Harvey,	*Champaign*,	Mechanical Eng.
Tarble, Myron J.,	*Aurora*,	Civil Engineering.
Teeple, Wallace Douglas,	*Marengo*,	Architecture.
Templeton, Benjamin Franklin,	*Palestine*,	Ancient Languages.
Tominaga, Kotaro,	*Tokio, Japan*,	Agriculture.
Power, Willis Eugene,	*Chana*,	Chemistry.
Townsend, William,	*Champaign*,	Civil Engineering.
Train, Robert Farquhar,	*Hastings, Neb.*,	Architecture.
Trego, Charles Henry,	*Hoopeston*,	Mechanical Eng.
Wade, Lenoard George,	*Champaign*,	Chemistry.
Walton, Thomas Percival,	*Paxton*,	Civil Engineering.
Weaver, Leslie Alvord,	*Danville*,	Ancient Languages.
Williams, Scott,	*Bloomington*,	Mechanical Eng.
Winchell, Harley Corson,	*Champaign*,	Ancient Languages.
Wiswall, Thomas,	*Alexander*,	Civil Engineering.
Wraith, William,	*Streator*,	Mining Engineering.
Yeakel, William Krebel,	*Polo*,	Natural History.
Adams, Clara Louise,	*Mendota*,	Natural History.
Arnold, Mary Edna,	*Utah*,	Ancient Languages.

†Deceased.

Beidler, Gertrude Lou,	*Champaign,*	Eng. and Mod. Lang
Boggs, Arclissa Florence,	*Urbana,*	Natural History.
Borden, Susan May,	*Champaign,*	Eng. and Mod. Lang.
McCaskrin, Louise Elizabeth,	*Rantoul,*	Natural History.
Myers, Maud Ossoli,	*Champaign,*	Eng. and Mod. Lang.
Naughton, Katheryn Louise,	*Champaign,*	Eng. and Mod. Lang.
Nichols, Maude E.	*Urbana,*	Chemistry.
Nydegger, Louise,	*Farmer City,*	Eng. and Mod. Lang.
Plaut, Mayme,	*Danville,*	Eng. and Mod. Lang.
Powers, Jessie Lucie,	*Belvidere,*	Eng. and Mod. Lang.
Read, Josephine,	*Champaign,*	Eng. and Mod. Lang.
Ryder, Edith Marion,	*Monticello,*	Eng. and Mod. Lang.
Scott, Daisy Coffin,	*Champaign,*	Eng. and Mod. Lang.
Shawhan, Gertrude,	*Urbana,*	Eng. and Mod. Lang.
Swartwout, Mina Louisa,	*Dixon,*	Natural History.
Webber, Grace,	*Urbana,*	Natural History.
Wilder, Elizabeth C.	*Champaign,*	Eng. and Mod. Lang.
Wingard, Anna Laura,	*Champaign,*	Eng. and Mod. Lang.

PREPARATORY CLASS.

Abraham, Arthur Leonard,	*Watson,*	
Allen, Albert Miller,	*Hannibal, Mo.,*	Architecture.
Arends, Homer Albertus,	*Urbana,*	Eng. and Mod. Lang.
Arnold, Willard D.,	*Haldane,*	Chemistry.
Ashley, Richard Jason,	*Tonica,*	Mechanical Engineering.
Ayers, Clarence Otto,	*Nashville,*	Natural History.
Barnes, Charles Earle,	*Decatur,*	
Barr, Richard James,	*Wilton Center,*	
Beebe, Fred Albert,	*Wisner, Neb.,*	Mechanical Eng..
Beeman, Marion Nelson,	*Robinson,*	Eng. and Mod. Lang.
Bissell, Frank,	*Farmer City,*	Eng. and Mod. Lang.
Boggs, Fortune Stanley,	*Urbana,*	
Boon, William G.	*Armstrong,*	Civil Engineering.
Boone, Charles Edwin,	*Chrisman,*	
Brode, Arthur Willis,	*Buda,*	Mechanical Eng.
Brown, Fred Gage,	*Urbana.*	
Buck, Charles Hamilton,	*Freeport,*	Chemistry.
Buck, James P.	*Bloomfield, Mo.,*	Eng. and Mod. L.
Burdsal, Charles Southerd,	*South Evanston.*	
Burt, James D.	*Aurora, Neb.,*	Architecture.

Campbell, George Henry,	*Edgewood,*	Natural History.
Carberry, Ray Shepard,	*Mansfield,*	Civil Engineering.
Carmack, Clyde Robert,	*Camargo,*	Mechanical Eng.
Chester, Henry Ezra,	*Champaign.*	
Chester, Wilfred Dudley,	*Champaign,*	Civil Engineering.
Cook, Harvey,	*Tolono,*	Chemistry.
Cornell, Frank Howe,	*Yorkville,*	Eng. and Mod. Lang.
Cowles, Roy Merrick,	*Englewood,*	Mechanical Eng.
Decius, Lyle,	*Toledo,*	Eng. and Mod. Lang.
Dillon, William Henry,	*Normal,*	Architecture.
Drake, Lewis Sanford,	*Chicago,*	Eng. and Mod. Lang.
Earley, John Allen,	*Batchtown,*	Civil Engineering.
Eaton, William Otis,	*Champaign.*	
Emmons, Henry Jeffers,	*Atkinson,*	Civil Engineering.
Erwin, Verna,	*Louis,*	Civil Engineering.
Farrand, Fred H.,	*Griggsville,*	Agriculture.
Fay, Frank Earle,	*Marengo,*	Civil Engineering.
Fellheimer, Alfred,	*Chicago.*	
Fletcher, Marcus Samuel,	*Ridge Farm,*	Civil Engineering.
Foster, Edward, Jr.,	*Armstrong,*	
Fowler, David,	*Charity,*	Eng. and Mod. Lang.
French, Ernest,	*Pana.*	
Granger, Guy,	*Champaign.*	
Grattan, William Taylor,	*Gallatia.*	
Green, James Albert,	*Ivesdale,*	Eng. and Mod. Lang.
Gulick, Seeley,	*Champaign,*	Chemistry.
Guthrie, Fred A.,	*Aledo,*	Eng. and Mod. Lang.
Hammett, John Burnham,	*Camargo,*	Natural History.
Heydenburg, Charles Alvin,	*Champaign.*	
Hoblit, John Alexander, Jr.,	*Atlanta,*	Eng. and Mod. Lang.
Hoffa, John,	*Forreston,*	Natural History.
Hoyt, William Judson,	*Chicago,*	Chemistry.
Hughes, Samuel Kelso,	*Kunkle, Ohio,*	Eng. and Mod. Lang.
Jameson, Stuart Wells,	*Farmer City,*	Ancient Lang.
Johnson, Claude Friend,	*Chandlerville,*	Ancient Lang.
Kasano, H. Yeizo,	*Tokio, Japan,*	Civil Engineering.
Kilgour, Cassius Mathers,	*Sterling.*	
Killam, Francis Grimes,	*Comer,*	Mechanical Eng.
Kirtley, Charles Wilson,	*Quincy,*	Mechanical Eng.
Lawson, John Bell,	*Harvey,*	Mechanical Eng.
Lee, Robert, Jr.,	*Cable,*	Civil Engineering.

Lewellyn, David Rossiter,	*Sterling.*	
Linderholm, Martin Julius,	*Altona,*	Civil Engineering.
Lotz, George Norton,	*Lockport,*	Eng. and Mod. Lang.
Lyons, Timothy John,	*Sadorus,*	Mechanical Engineering.
McKinney, George Bester,	*Barry,*	Mechanical Engineering.
McMains, Harrison,	*Armstrong,*	Civil Engineering.
McNutt, John, Jr.,	*Humbolt,*	Eng. and Mod. Lang.
Mann, Clyde Allison,	*Geneva.*	Chemistry.
Maxwell, Charles Jacob,	*Champaign,*	Chemistry.
Miller, Frank Arthur,	*Chicago,*	Mechanical Engineering.
Miller, Mortimer Ridell,	*Rockford,*	Civil Engineering.
Mogensen, Peter,	*Copenhagen, Den.,*	Civil Engineering.
Moore, Edward,	*Humbolt,*	Eng. and Mod. Lang.
Morrison, Charles Hugh,	*Odin,*	Eng. and Mod. Lang.
Morrow, Clarence Gifford,	*Champaign,*	Agriculture.
Myers, James William,	*Chrisman,*	Ancient Lang.
Naughton, Charles Colby,	*Champaign,*	Chemistry.
Parker, Walter A.,	*Champaign,*	Eng. and Mod. Lang.
Parry, Joseph Lawrence,	*Tolono,*	Eng. and Mod. Lang.
Pinkerton, Cyrus Bertram Eugene,	*Rantoul,*	Ancient Lang.
Pratt, Walter Merrill,	*Earlville,*	Mechanical Eng.
Ravlin, Frank West,	*Kaneville,*	Civil Engineering.
Ravlin, Fred J.	*Kaneville,*	Mechanical Eng.
Reed, James Horatio,	*Evanston,*	Mechanical Eng.
Ricketts, Gil Bert,	*Fisher.*	Mechanical Eng.
Roberts, Francis Eugene,	*Chicago,*	Civil Engineering.
Sale, Leslie Oscar,	*Fisher.*	
Sanders, Ralston Harvey,	*Chicago,*	Mechanical Eng.
Schierbaum, Emanuel Albert,	*Grantfork.*	Natural History.
Schlacks, Joseph T.,	*Chicago.*	Mechanical Engineering.
Schricker, Richard Lælius,	*Davenport, Iowa,*	Mining Eng.
Scott, Hugh,	*Bethany.*	
Shepardson, John Eaton,	*Aurora.*	
Shurts, Richard Elmer,	*Champaign,*	Chemistry.
Smith, Martin Alonzo,	*LaMoille,*	Mechanical Engineering.
Smith, Simeon Carl Cecil,	*Griggsville,*	Architecture.
Spurgin, William Grant,	*Urbana,*	Ancient Languages.
Stoltey, Benjamin Franklin,	*Champaign,*	Architecture.
Stroker, George Dick,	*Palatine,*	Civil Engineering.
Stuart, Will Taylor,	*Cairo,*	Mechanical Engineering.
Sullivan, John Laurence,	*Mansfield,*	Eng. and Mod. Lang.

Swartz, William Commodore,	*Urbana*,	Eng. and Mod. Lang.
Tilton, Clinton Clay,	*Catlin*,	Eng. and Mod. Lang.
Warfield, Roy Mary,	*Quincy*,	Electrical Engineering.
Webster, Charles Carlton,	*Polo*,	Natural History.
Weedman, Fred John,	*Farmer City*,	Eng. and Mod. Lang.
Whittemore, Leonard Archie,	*Verona*,	Mechanical Eng.
Wilkinson, Arthur Lewis,	*Argenta*,	Natural History.
Withers, Arthur Seward,	*Englewood*,	Mechanical Eng.
Withers, William Aaron,	*Englewood*,	Chemistry.
Young, Clyde Cyrus,	*Stonington*,	Natural History.
Bauer, Bertha Lizzie,	*Bunker Hill*,	Eng. and Mod. Lang.
Boggs, Pearl,	*Urbana*,	Ancient Languages.
Bonner, Kate Porter Harper,	*Champaign*.	
Bryan, Willhelmie,	*Parkville*.	
Burton, Dora Francelia,	*Mahomet*,	Eng. and Mod. Lang.
Candy, Maie,	*Urbana*,	Ancient Languages.
Fisher, Cora,	*Champaign*,	Natural History.
Forbes, Bertha,	*Champaign*.	
Hicks, Estella,	*Rantoul*,	Eng. and Mod. Lang.
Hopper, Georgia Etherton,	*Lockport*,	Eng. and Mod. Lang.
Howse, Darlie P.	*Champaign*.	
Lewis, Sadie Annette,	*Cherry Point*,	Eng. and Mod. Lang.
Parker, Nettie Florence,	*Champaign*,	Natural History.
Parsons, Ella Belle,	*Trave, Iowa*,	Eng. and Mod. Lang.
Peck, Hattie,	*Fisher*,	Eng. and Mod. Lang.
Peck, Millicent Orville,	*Fisher*,	Eng. and Mod. Lang.
Pillsbury, Bertha Marion,	*Urbana*,	Ancient Languages.
Scott, Anna Maud,	*Champaign*,	Eng. and Mod. Lang.
Shepardson, Mary Frances,	*Aurora*,	Natural History.
Woolsey, Ola C.	*Polo*,	Eng. and Mod. Lang.

SPECIAL STUDENTS.

Allen, David Hammond,	*Delavan*,	Agriculture.
Allen, Fred Starbuck,	*Delavan*,	Agriculture.
Baker, William Alfred,	*Champaign*,	Microscopy.
Brawner, Charles L.	*Delavan*,	Agriculture.
Daughmer, Frank Ulysses,	*Douglas*,	Agriculture.
Gove, Aaron Morrill,	*Denver, Col.*,	Architecture.
Grayson, Franklin Charles,	*Paxton*,	Veterinary Science.

Hammett, Richard Clyde,	*Camargo,*	Agriculture.
Howe, Dick,	*Urbana,*	Architecture.
Hurst, Huizuiga Meschert,	*Springfield,*	Chemistry.
Kuhnen, Adolph,	*Highland,*	Agriculture.
Larimore, Edward Norton,	*Plainville,*	Agriculture.
Leeper, William R.,	*Coulterville,*	Agriculture.
Lodge, Charles Vanalbert,	*Monticello,*	Agriculture.
Richmond, Charles Albert,	*Villa Grove,*	Agriculture.
Russell, Joseph Edgar,	*Ipava,*	Agriculture.
Sims, L J.	*Lincoln,*	Leveling.
Wilson, Charles Wesley,	*Shelbyville,*	Agriculture.
VanTine, Clarence,	*Suez,*	Agriculture.
Crannell, Emma,	*Champaign,*	Art and Design.
Gibbs, Mrs. Sarah,	*Marshalltown, Ia.,*	Art and Design.
McFadden, Lill,	*Champaign,*	Art and Design.
Maxwell, Nellie,	*Champaign,*	Art and Design.

SUMMARY.

BY CLASSES.	MEN.	WOMEN.	TOTAL.
Resident Graduates	1	2	3
Seniors	37	12	49
Juniors	49	6	55
Sophomores	90	11	101
Freshman	136	20	156
Preparatory	112	20	132
Special	19	4	23
Total	444	75	519
BY COURSES.			
Agriculture	22	......	22
Mechanical Engineering	78	......	78
Electrical Engineering	1	......	1
Civil Engineering	95	......	95
Mining Engineering	5	......	5
Architecture	73	......	73
Chemistry	50	1	51
Natural History	35	16	51
Art and Design	......	4	4
English and Modern Languages	52	43	95
Ancient Languages	12	5	17
Not Specified	21	6	27
Total	444	75	519

LIST OF GRADUATES OF 1890.

		Degree.	Course.
Barr, James,	*Urbana*,	B.S.,	Mech. Eng.
Bawden, Samuel Day,	*Champaign*,	B.S.,	Mech. Eng.
Beardsley, John,	*Champaign*,	B.L.,	Eng. and Sci.
Benson, Edward Mills,	*Colfax*,	B.S.,	Civil Eng.
Bennett, Cleaves,	*Mattoon*,	B.L.,	Eng. and Sci.
Bowsher, Columbus Austin,	*Barnett*,	Certificate.	
Boyle, Anna Cecilia,	*Champaign*,	B.L.	Eng. and Sci.
Brumbach, Lucia Ray,	*Gilman*,	B L.,	Eng. and Sci.
Camp, Norman Harvey,	*Chanute, Kas.*,	B.S.,	Natural History.
Clark, Edith Louisa,	*Urbana*,	Certificate.	
Clark, Thomas Arkle,	*Urbana*,	B.L.,	Eng. and Sci.
Clark, Frank Henry,	*Urbana*,	B.S.,	Mech. Eng.
Clarkson, James Francis,	*Chicago*,	B.S.,	Civil Eng.
Cooke, Robert James,	*East Newbern*,	B.S.,	Civil Eng.
Cornelison, Robert Wilson,	*Washington*,	B S.,	Chemistry.
Crabbs, Clarence Lincoln,	*Gibson City*,	B.S.,	Civil Eng.
Clinton, George Perkins,	*Polo*,	B.S ,	Natural History.
Ellars, Jessie,	*Tuscola*,	B A.,	Ancient Lang.
Fisher, John Franklin,	*Indianola*,	B.S.,	Civil Eng.
Gilliland, William Myers,	*Coatsburg*,	B.S.,	Mech. Eng.
Hanssen, Gustavus Adolphus,	*Davenport, Ia.*,	Certificate.	
Hazleton, Hugh,	*Forest Glen*,	B.S.,	Mech. Eng.
Keene, Edward S.,	*Moline*,	B.S.,	Mech. Eng.
Kennard, Katherine Louise,	*Champaign*,	B.L.,	Eng. and Sci.
Kinkead, David Robinson,	*Earlville*,	B.S.,	Mech. Eng.
The same,		B.S.,	Civil Eng.
Manny, Walter Isham,	*Mounds*,	Certificate.	
Moore, Byron Llewellyn,	*Champaign*,	B.S.,	Chemistry.
McCandless, H. Wallace,	*Orion*,	B.S.,	Mech. Eng.
McKee, Will E.,	*Rising*,	B.S.,	Mech. Eng.
Nesbit, Edwin,	*Charleston*,	B.S.,	Mech. Eng.
Peoples, U. J. Lincoln,	*Allegheny City, Pa.*,	Certificate.	
Proctor, Orla A.	*Rome*,	B.S ,	Natural History.
The same,		B.L.,	Eng. and Sci.
Shamel, Charles H.,	*Willey*,	B.S.,	Chemistry.
Schaefer, Philemon A.	*Parral, Mexico*,	Certificate.	
Snyder, Christopher Henry,	*Fulton*,	B.S.,	Civil Eng.
Stevens, Fred Worthley,	*Odell*,	Certificate.	

Tresise, Frank John,	*Sharon, Pa.*,	B.S.,	Civil Eng.
Terbush, Linsley F.,	*Champaign*,	B.L.,	Eng and Sci.
Tscharner, John Baptiste,	*Okawville*,	B S.,	Civil Eng.
Waterman, Fred Walter,	*Sycamore*,	B.S.,	Mech. Eng.
White, James McLaren,	*Peoria*,	B.S.,	Architecture.
Wilbur, Frank Dent,	*Champaign*,	B.L.,	Eng. and Sci.
Wilson, Robert Conover,	*Bloomington*,	B.S.,	Natural History.
Wilkinson, George Eldorado,	*Argenta*,	B.S.,	Natural History.
Sparks, Myrtle Eva,	*Champaign*,	M.A.,	Ancient Lang.
Ross, Luther Sherman,	*Reno*,	M.S.,	Natural History.

COMMISSIONED BY THE GOVERNOR AS CAPTAINS BY BREVET IN THE ILLINOIS NATIONAL GUARD.

Barr, James,
Bawden, Samuel Day,
Clark, Frank Henry,
Clarkson, James Francis,
Cooke, Robert James,
Crabbs, Clarence Lincoln,
Fisher, John Franklin,
Hazleton, Hugh,
Tresise, Frank John,
Waterman, Fred Walter,
White, James McLaren,
Wilkinson, George Eldorado.

Named to the Secretary of War as worthy of

SPECIAL COMMENDATION.

White, James McLaren,
Crabbs, Clarence Lincoln,
Hazleton, Hugh.

WINNER OF THE HAZLETON PRIZE MEDAL.

Hubbell, James Pease.

WINNER IN THE COMPETITIVE DRILL.

Company A; Frank Harvey Eno, Captain.

WINNERS IN THE JUNIOR PRIZE SPEAKING CONTEST.

Green, Thomas Stephen, First Prize,
McCormick, Wirt, Second Prize.

HONORARY SCHOLARSHIPS.

The following named counties have been represented during the year by the students named :

Adams.	Woodruff, Thomas Tyson.
Brown.	Bartlett, Henry Emmett.
Bureau.	Forbes, Robert H.
Champaign.	Snodgrass, William, Jr.
Clinton.	Earl, Mark Alden.
Coles.	Bennett, Sarah.
Cook.	Hart, Ralph Warner.
Crawford.	Templeton, Benjamin Franklin.
Du Page.	Heideman, George Hermann.
Ford.	Lowry, James Percival.
Jasper.	Carrick, William.
Lee.	Swartwout, Mina Louisa.
Madison.	Suppiger, Albert Eugene.
Marshall.	Johnson, John Cummins.
Peoria.	Beasley, Harrison Easton.
Piatt.	Brown, Frank.
Rock Island.	Johnson, Harriette Augusta.
St. Clair.	Klingelhoefer, Charles Benjamin.
Scott.	Gibbs, William David.
Union.	Crawford, John.
Vermilion.	Yeomans, Frances Anna.
Wabash.	Leeds, Harmon Gibson.

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(Post Office, Champaign, Ill.)

1891-92

Published by the University

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——— ———, Professor of Physical Culture.

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CHARLES ARTHUR HART, Office Entomologist.
915 West Green Street, U.

JOHN MARTEN, Field Entomologist. *602 West Hill Street, C.*

MARY JANE SNYDER, Stenographer. *601 John Street, C.*

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University Farm, U.

WILLIAM LOW PILLSBURY, M.A., Secretary.
504 West Elm Street, U.
Office, third story of Chemical Building.

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EDWARD HOLYOKE FARRINGTON, M.S., Chemist.
201 Randolph Street, C.

PROFESSOR STEPHEN ALFRED FORBES, PH.D., Consulting Entomologist. *1109 Springfield Avenue, U.*

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509 East University Avenue, C.

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801 West Green Street, C.

FRANK DUANE GARDNER, B.S., Assistant Agriculturist.
606 East Green Street, C.

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Address:

AGRICULTURAL EXPERIMENT STATION,
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GEOGRAPHICAL POSITION OF THE UNIVERSITY.

The Observatory has the following position:

Latitude, 40° 6′ 29″.66.

Longitude, west of Washington, 11° 10′ 37″.5, or 44m. 42.5s.

Elevation above sea level, 720 feet.

UNIVERSITY OF ILLINOIS.

HISTORY.

The University of Illinois had its origin in a movement for the higher education of the industrial classes, begun in Illinois in 1851, and resulting in the congressional grant of lands for this purpose, made to the several states in 1862, and amounting in this state to 480,000 acres. The University was chartered in February, 1867, and opened to students in March, 1868. In addition to the endowment from the land grant, $100,000 in bonds, 1,000 acres of land, and the building in which the institution was opened were donated by Champaign county. The state also has made large appropriations for fitting up and stocking the farms, for library and apparatus, and for buildings, including the large main building erected in 1872 and 1873, the mechanical building, the chemical laboratory, completed in 1878, a commodious military building, finished in 1890, and a natural science building in course of erection. In 1874 a fine art gallery was established.

The whole number matriculated as students since the opening is 2,762. The number graduated from the several colleges, including the class of 1891, is 693. In 1871 the University was opened for women, on the same terms as to men.

The University has a beautiful and healthful situation on the high grounds between the cities of Champaign and Urbana, within the corporate limits of the latter. It is one hundred and twenty-eight miles south from Chicago, at the junction of the Illinois Central, the Cleveland, Cincinnati, Chicago and St. Louis, and the Wabash railways. The country is a region of beautiful rolling prairies, with large belts of timber along the streams, and is one of the richest farming districts of the state.

BUILDINGS AND GROUNDS.

The land occupied by the University and its several departments embraces about 610 acres, including stock farm, experimental

farm, orchards, forest plantation, arboretum, ornamental grounds, and military parade grounds.

The main University building, designed wholly for public uses, occupies three sides of a quadrangle, measuring 214 feet in front and 122 feet upon the wings. The library wing contains in spacious halls the museum of natural history, the library, the art gallery, and the museum of industrial art. The chapel wing contains the chapel, the physical laboratory and lecture room, and rooms occupied by the departments of architecture, and of art and design. In the main front are convenient class-rooms, and on the upper floor, elegant halls for literary societies. The building is warmed by steam.

The mechanical building is of brick, 126 feet in length, and 88 feet in width. It contains a boiler-room, a machine shop furnished for practical use with a steam engine and lathes, and other machinery; pattern and finishing shop; testing laboratory; shops for carpentry and cabinet work, furnished with wood-working machinery. The blacksmith shop contains sixteen forges with anvils and tools, and a cupola for melting iron.

The chemical building contains five well equipped laboratories, sufficient to accommodate 250 students.

A military building, erected in 1889–90, 100 by 150 feet in one grand hall, gives ample space for company and battalion maneuvers and for large audiences upon special occasions. It is also used as a gymnasium.

There are, in addition, a veterinary hall, a small astronomical observatory, three dwellings, two large barns, and a greenhouse.

The new natural science building, under contract for $60,000, will be open for use in September, 1892.

MUSEUMS AND COLLECTIONS.

The museum of zoölogy and geology occupies a hall 61 by 79 feet, with a gallery on three sides, and is completely furnished with wall, table, and alcove cases. It already contains interesting and important collections, equaled at few, if any, of the colleges of the West. They have been specially selected and prepared to illustrate the courses of study in the school of natural history, and to present a synoptical view of the zoölogy of the state.

Zoology.—The mounted *mammals* comprise an unusually large and instructive collection of the ruminants of our country, includ-

ing male and female moose, elk, bison, deer, antelope, etc.; and also several quadrumana, large carnivora and fur-bearing animals, numerous rodents. good representative marsupials, cetaceans, edentates, and monotremes. Fifty species of this class are represented by eighty specimens.

The collection of mounted *birds* (about five hundred and fifty specimens of three hundred species), includes representatives of all the orders and families of North America, together with a number of characteristic tropical forms. Many of these specimens are excellent examples of artistic taxidermy. A series of several hundred unmounted skins is available for the practical study of species.

The set of *skeletons* contains examples of all the orders of mammals and birds except *proboscidæ*, together with typical representatives of the principal groups of reptiles, amphibians, and fishes.

The *cold-blooded vertebrates* are also represented by a very useful collection of alcoholic specimens, plaster casts, and mounted skins of the larger species, both terrestrial and marine.

Embryology is illustrated by a set of Ziegler wax models, and several series of slides. sections, and other preparations.

Conchology is illustrated by several thousand shells belonging to seventeen hundred species; together with alcoholic specimens of all classes and orders. The collection of Illinois shells is fair, but incomplete.

The *entomological cabinet* contains about three thousand species (principally American), named, labeled, and systematically arranged.

The *lower invertebrates* are represented by several hundred dried specimens and alcoholics, and by a large series of the famous Blaschka glass models.

Botany.—The herbarium contains nearly all the species of flowering plants indigenous to Illinois, including a complete set of grasses and sedges. The flora of North America is fairly well represented, and a considerable collection of foreign species has been made. A collection of fungi includes a very full set of those most injurious to other plants, causing rusts, smuts, moulds, etc. A collection of wood specimens from two hundred species of North American trees well illustrates the varieties of native wood.

Plaster casts represent fruits of many of the leading varieties, as well as interesting specimens of morphology, showing peculiarities of growth, effects of cross-fertilization, etc.

Geology.—The geological collection comprises many of the largest and most remarkable fossils hitherto discovered in the various

geological formations, illustrating the general progress of life in the mollusks, fishes, reptiles, and mammals, from the oldest paleozoic time to the present. A fine set of fossils from Germany, and collections suitably arranged for practical study, from this and other states, illustrate the different formations. There is a good collection of foot-prints from the Connecticut river sand-stones.

Lithology.—This collection embraces the principal kinds of metamorphic and volcanic rocks: examples of stratification in the limestone and fragmental kinds, with many samples of such rocks as are found most valuable for building purposes.

Mineralogy.—The specimens of minerals show all the groups, and all the important and typical species. All the metals are represented; also many of their most important combinations. Many of the specimens are finely crystalized: these, with a complete set of imported models, fully illustrate crystalography.

Agriculture.—A collection of soils from different portions of Illinois and other states; many varieties of corn, wheat, and other cereals and seeds; specimens illustrating the official state inspection of grains at Chicago, showing the quality of the different grades recognized; models of agricultural inventions; models illustrating modes and materials for drains; casts of ancient plows; engravings, lithographs, and photographs of typical animals of noted breeds.

The farms give good illustrations of farm buildings, implements, machinery, modes of culture, and of domestic animals of various classes.

Physics.—The cabinets of the physical laboratory contain a collection of apparatus from the most celebrated European and American makers, illustrating the subjects of mechanics, pneumatics, optics, and electricity.

A series of standard weights and measures from the office of the Coast and Geodetic Survey of the United States may be consulted at the physical laboratory.

ART GALLERY.

The University art gallery was the gift of citizens of Champaign and Urbana. It occupies a beautiful hall, 61 by 79 feet, and the large display of art objects has surprised and delighted all visitors. In sculpture it embraces thirteen full-size casts of celebrated statues, including the Laocoön group, the Venus of Milo, etc., forty

statues of reduced size, and a large number of busts, ancient and modern, bas reliefs, etc., making over four hundred pieces. It includes also hundreds of large autotypes, photographs, and fine engravings, representing many of the great masterpieces of painting of nearly all the modern schools. Also a gallery of historical portraits, mostly large French lithographs of peculiar fineness, copied from the great national portrait galleries of France. The value of this splendid collection, as a means of education, is shown in the work of the course of drawing and design of the University.

MUSEUM OF INDUSTRIAL ARTS.

A large room is devoted to a museum of practical art, the materials for which are constantly accumulating in the various scientific departments. Prominent among the agricultural specimens here exhibited is an excellent collection of the sub-species and varieties of Indian corn, including the best of their kinds, a considerable collection of small grains and of grasses, a collection of fibers in various states of manufacture, and a series of analyses of grains showing at a glance the elements and proportion of structure. The museum contains full lines of illustrations of the work of the shops; models made at the University or purchased abroad; drawings in all departments; Patent Office models, etc., samples of building materials, natural and artificial; a large collection illustrating the forestry of Illinois, Florida, and California; with whatever may be secured that will teach or illustrate in this most important phase of University work. The elegant exhibit made by the University at the Centennial and Cotton Exposition at New Orleans, finds a permanent abode in this apartment.

A notable feature of this collection is the gift of Henry Lord Gay, architect, of Chicago. It consists of a model in plaster, and a complete set of drawings of a competitive design for a monument to be erected in Rome, commemorative of Victor Emanuel, first king of Italy. The monument was to be of white marble, an elaborate gothic structure, beautifully ornamented, and 300 feet high. Its estimated cost was to have been seven and a quarter millions of francs. The design was placed by the art committee second on a list of 289 competitors; but both the first and second were set aside for political reasons. Mr. Gay's generous gift occupies the place of honor in the museum of industrial arts.

LIBRARY.

The library, selected with reference to the literary and scientific studies required in the several courses, had March 1, 1892, 21,216 volumes, and important purchases have been made since that date.

The large library hall fitted up as a reading room, is open throughout the day for study, reading, and consulting authorities. It is intended that the use of the library shall largely supplement the class-room instruction in all departments. Constant reference is made in classes to works contained in the library, and their study is encouraged or required. The reading room is well provided with American, English, French, and German papers and periodicals, embracing some of the most important publications in science and art.

The State Laboratory of Natural History is rich in the world's best literature upon biological sciences. and affords advanced students excellent opportunities for work in this line.

The library of the Agricultural Experiment Station has 2,800 volumes, and 1,600 pamphlets. This is also accessible to students.

LABORATORIES.

These essential facilities for modern educational work have been provided at the cost of large sums of money, and of much care to have them best suited for their various purposes. They are thoroughly well equipped.

The chemical laboratories occupy a building 75 by 120 feet, four stories high, including basement and mansard. The basement is used for storage, and for work in mining and metallurgy; the first floor has a lecture room, a laboratory for quantitative work, for one hundred and fifty students, and several subsidiary rooms; the second floor, its laboratories for qualitative analysis, private work, lecture rooms, store room, etc.; and on the uppermost floor is the laboratory of the Agricultural Experiment Station, and apartments for photography.

The new natural science building is to be occupied in September, 1892, with the laboratories and lecture rooms for the work and instruction in botany, zoölogy, physiology, mineralogy, and geology; it will also contain the office and equipments of the State Laboratory of Natural History and of the State Entomologist, as well as the office and library of the Agricultural Experiment Station. There are six laboratory rooms on each of the main floors—sufficient altogether to

accommodate readily two hundred students, besides offering abundant facilities for the private work of the instructors. The laboratory work in these departments constitutes a very large part of the instruction.

The physical laboratory and lecture room are in the main building, occupying large, well lighted, and well arranged apartments. Students have ample facilities for experimental work and opportunity to prosecute it under the guidance of the instructors.

The electrical laboratory, recently fitted up, is also in the main building. It has five rooms each especially adapted to its distinct purpose, and equipped for work in experiment and research. The laboratory has its own power from steam and gas engines.

The testing laboratory, located in the mechanical building, gives opportunity to students of the college of engineering to make various practical experiments and tests, and to prosecute original investigations in the lines of their specialities.

The mechanical laboratory occupies a large part of both floors of the mechanical building, and each of its departments is equipped for practical work by students. There is a large machine shop with hand and machine tools for all the required operations, a pattern shop, a blacksmith shop, a foundry, a boiler room, etc.

The laboratory for mining engineers, located in the chemical building, is equipped upon a large scale for the work in ore dressing, assaying, metallurgy, and surveying. Students make use of machinery, furnaces, and instruments as in practical work.

The architectural workshops, in the same building with the mechanical laboratory, are fully equipped for bench and lathe work, and are supplied with all essential machine tools. Students become familiar with the tools and the work of the carpenter and cabinet maker, as well as with the draughting operations of the architect's office.

The farms, fruit, and forestry plantations, and gardens offer abundant illustrations of the work associated with the courses of instruction in agriculture and horticulture. The varied and carefully conducted operations of the Agricultural Experiment Station afford excellent aids to students in these departments. For its specific purposes there are used about one hundred of the six hundred and ten acres comprised in the University farms and grounds.

GENERAL LIST OF SUBJECTS.

This list gives all the subjects and the entire number of courses of instruction offered to students of the University. Fuller information will be found under these same headings appropriately distributed under the different colleges and schools. The number of hours a week stated is the time required in the class rooms and laboratories; when more than five, laboratory practice forms a part, at least, of the exercise.

PHILOSOPHY—

1. Mental Science. Fall term, 5 hours a week.
2. Introduction to Philosophy. Winter term, 5 hours a week.
3. Logic. Winter term, 5 hours a week.
4. History of Philosophy. Spring term, 5 hours a week.

PEDAGOGY—

1. Educational Psychology. Fall term, 5 hours a week.
2. Science of Instruction. Winter term, 5 hours a week.
3. Special Methods in Education. Spring term, 5 hours a week.
4. School Supervision. Fall term, 5 hours a week.
5. History of Education. Winter term, 5 hours a week.
6. Philosophy of Education. Spring term, 5 hours a week.

POLITICAL ECONOMY—

1. Political Economy. Spring term, 5 hours a week.

HISTORY—

1. General History. Fall, winter, and spring terms, 5 hours a week.
2. History of Civilization. Fall term, 5 hours a week.
3. Constitutional History. Winter and spring terms, 5 hours a week.
4. Constitutional History. For students who have not had course 1. Winter term, 5 hours a week.

GREEK—

1. Herodotus. Fall term, 5 hours a week.
2. Xenophon's Hellenica. Winter term, 5 hours a week.
3. Xenophon's Memorabilia. Spring term, 5 hours a week.
4. Lysias and Demosthenes. Fall term, 5 hours a week.
5. Plato's Apology and Selections from Phædo. Winter term, 5 hours a week.
6. Aeschylus's Prometheus Bound and Euripides' Alcestis. Spring term, 5 hours a week.
7. Homer's Iliad. Fall term, 5 hours a week.
8. Aristophanes' Clouds. Winter term, 10 hours a week.
9. Lyric Poets. Spring term, 10 hours a week.

LATIN—

1. Livy and Prose Composition. Fall term, 5 hours a week.
2. Cicero de Amicitia. Winter term, 5 hours a week.
3. Horace. Spring term, 5 hours a week.
4. Tusculan Disputations. Fall term, 5 hours a week.
5. Horace's Satires. Winter term, 5 hours a week.
6. Tacitus and Roman Archæology. Spring term, 5 hours a week.
7. Quintilian. Fall term, 5 hours a week.
8. Juvenal's Satires. Winter term, 5 hours a week.
9. Cicero de Officiis. Spring term, 5 hours a week.

FRENCH—

1. For students in College of Literature. Fall, winter, and spring terms, 5 hours a week.
2. For students in College of Literature. Fall, winter, and spring terms, 5 hours a week.
3. For students in College of Literature. Fall, winter, and spring terms, 5 hours a week.
4. For students in Colleges of Agriculture, Engineering, and Science. Fall, winter, and spring terms, 5 hours a week.

ITALIAN—

1. Course of one year (given in 1892–3). Fall, winter, and spring terms, 5 hours a week.

SPANISH—

1. Course of one year (given in 1893–4). Fall, winter, and spring terms, 5 hours a week.

GERMAN—

1. For students in College of Literature. Fall, winter, and spring terms, 5 hours a week.

2. For students in College of Literature. Fall, winter, and spring terms, 5 hours a week.

3. For students in College of Literature. Fall, winter, and spring terms, 5 hours a week.

4. For students in Colleges of Agriculture, Engineering, and Science. Fall, winter, and spring terms, 5 hours a week.

ENGLISH LITERATURE—

1. American Authors. Fall term, 5 hours a week.
2. British Authors. Winter and spring terms, 5 hours a week.
3. English Classics (Prose). Fall term, 5 hours a week.
4. English Classics (Verse). Winter term, 5 hours a week.
5. Shakspere. Spring term, 5 hours a week.
6. Old English (Anglo-Saxon). Fall term, 5 hours a week.
7. Middle English. Winter term, 5 hours a week.
8. Science of Language. Spring term, 5 hours a week.

RHETORIC AND ORATORY—

1. Themes and Elocution, for students in Colleges of Agriculture, Engineering, and Science. Fall, winter, and spring terms. 3 hours a week.

2. Themes and Elocution, for students in College of Literature. First year, 2 hours a week; fourth year, 1 hour a week.

3. Elocution and Oratory. Elective course. Fall, winter, and spring terms, 2 hours a week.

MATHEMATICS—

1. Advanced Algebra, for students in Colleges of Agriculture, Science, and Literature. Fall term, 5 hours a week.

2. Advanced Algebra, for students in College of Engineering. Fall term, 5 hours a week.

3. Trigonometry, for students in Colleges of Agriculture, Science, and Literature. Winter term, 5 hours a week.

4. Trigonometry, for students in College of Engineering. Winter term, 5 hours a week.

5. Conic Sections. Spring term, 5 hours a week.

6. Analytical Geometry. Spring term, 5 hours a week.

7. Calculus and Analytical Geometry. Fall, winter, and spring terms, 5 hours a week.

DESCRIPTIVE ASTRONOMY—

1. For students in Colleges of Agriculture, Science, and Literature. Spring term, 5 hours a week.

2. For students in College of Engineering. Spring term, 5 hours a week.

PHYSICS—

1. Major Course. Fall, winter, and spring terms, 6 hours a week.

2. Minor Course. Winter term, 5 hours a week.

METEOROLOGY—

1. Atmospheric Conditions and Movements. One-half of fall term, 7 hours a week.

CHEMISTRY—

1. General and Experimental Chemistry. Fall term. 10 hours a week.

2. Qualitative Analysis. Winter and spring terms. 15 hours a week.

3. Quantitative Analysis and Assaying. Fall, winter, spring, and fall terms, 10 hours a week.

4. Organic Chemistry. Winter and spring terms, 10 hours a week.

5. Investigations and Thesis. Fall, winter, and spring terms, 10 hours a week.

6. Qualitative Analysis. Fall, winter, and spring terms, 10 hours a week.

7. Advanced Work for Agricultural Students. Fall, winter, and spring terms. 10 hours a week.

8. Pharmaceutical Chemistry. Fall, winter, spring, and fall terms, 10 hours a week.

9. Assaying. Winter term, 10 hours a week.

10. Metallurgy. Spring term, 5 hours a week.

Arrangements may be made for special course of advanced work.

MINERALOGY—

1. General Course. Fall term, 5 hours a week.

GEOLOGY—

1. General and Economic Geology. For students in College of Science. Winter and spring terms, 5 hours a week; fall term, 10 hours a week.

2. Special Advanced Work. Winter and spring terms, 10 hours a week.

3. Engineering Geology. Winter term, 10 hours a week.

4. General Geology. Spring term, 10 hours a week.

BOTANY—

1. Histology, Morphology, and Physiology. Fall, winter, and spring terms, 10 hours a week.

2. Bacteriology. Fall term, 10 hours a week.

3. Fungi. Winter term, 10 hours a week.

4. Reproduction. Spring term, 10 hours a week.

5. Investigations and Thesis. Winter and spring terms, 10 hours a week.

6. General Botany. Spring term. 7 hours a week.

ZOOLOGY—

1. General Zoölogy for students in College of Science. Fall. winter, and spring terms, 10 hours a week.

2. Embryology. Fall term, 10 hours a week.

3. Investigations and Thesis. Winter and spring terms, 10 hours a week.

4. Systematic Zoölogy (including Entomology). Fall, winter, and spring terms, 10 hours a week.

5. General Zoölogy. Winter term. 10 hours a week.

ENTOMOLOGY—

1. General and Economic Entomology. Winter and spring terms, 10 hours a week.

PHYSIOLOGY—

1. Human Physiology. Fall term, 5 hours a week.

BIOLOGY—

1. General Advanced Study. Spring term, 10 hours a week.

ANTHROPOLOGY—

1. Origin and Progress of Man. Fall term, 3 hours a week.

AGRICULTURE—

1. Farm Equipment. Fall term, 10 hours a week.

2. Animal Husbandry. Winter term, 5 hours a week.

3. Rural Economy. Winter term, 5 hours a week.

4. History of Agriculture. Half of spring term, 5 hours a week.

5. Rural Law. Half of spring term, 5 hours a week.

Veterinary Science—

1. Anatomy and Physiology. Fall term, 5 hours a week.

2. Principles and Practice of Veterinary Medicine. Winter and spring terms, 5 hours a week.

3. Materia Medica. Winter and spring terms, 5 hours a week.

Horticulture—

1. Fruit Culture. Fall term, 5 hours a week.

2. Forestry. Half of winter term, 5 hours a week.

3. Plant Houses and House Plants. Half of winter term, 7 hours a week.

4. Gardens. Spring term, 5 hours a week.

5. Elements of Horticulture. Winter term, 5 hours a week.

Art and Design—

1. For special students of Art and Design. Three years, 20 hours a week.

2. For special students of Design. Fall, winter, and spring terms, 20 hours a week.

3. For students in Architecture. Two years, 10 hours a week.

4. For students in Agriculture and Natural Science. Fall, winter, and spring terms, 10 hours a week.

5. For students in Mechanical, Electrical, Civil, and Mining Engineering, and Chemistry. Fall and winter terms, 10 hours a week.

6. For students in College of Literature. Three or six terms, 10 hours a week.

7. History of Art. Fall, winter, and spring terms, 1 hour a week.

General Engineering Drawing—

1. Elements of Draughting. Fall term, 10 hours a week.

2. Descriptive Geometry. Half of winter term and the spring term, 10 hours a week.

3. Lettering. Half of winter term, 10 hours a week.

Theoretical and Applied Mechanics—

1. Analytical Mechanics. Fall term, 5 hours a week.

2. Resistance of Materials. Winter term, 7 hours a week.

3. Hydraulics. Spring term, 7 hours a week.

Mechanical Engineering—

1. Shop Practice A. Fall, winter, and spring terms, 10 hours a week.

2. Mechanical Drawing and Construction. Fall, winter, and spring terms, 13 hours a week.
3. Mechanism. Fall term, 10 hours a week.
4. (*a*) Engineering Materials. Winter term, 4 hours a week.
 (*b*) Steam Engineering. Winter term. 6 hours a week.
5. Mechanics of Machinery. Spring term, 5 hours a week.
6. Heat Engines. Fall term, 5 hours a week.
7. Machine Design. Fall term, 10 hours a week.
8. Hydraulic Engines and Wind Wheels. Winter term, 5 hours a week.
9. Laboratory Practice. Winter and spring terms, 10 hours a week.
10. Estimates. Spring term, 5 hours a week.

ELECTRICAL ENGINEERING—

1. Electrical Measurements. Spring term, 10 hours a week.
2. Primary and Secondary Batteries. Fall term, 10 hours a week.
3. Laboratory Practice. Winter term, 10 hours a week.
4. Electro-Magnetism and Dynamo-Electric Machinery. Winter term, 10 hours a week.
5. Alternating Currents and Machines. Spring term, 10 hours a week.
6. Installation of Light and Power Plants. Spring term, 6 hours a week.
7. Photometry. Spring term, 4 hours a week.

CIVIL ENGINEERING—

1. Land Surveying. Fall term, 10 hours a week.
2. Topographical Drawing and Surveying. Winter and spring terms, with course 3 takes 10 hours a week.
3. Transit Surveying and Leveling. Winter and spring terms, with course 2 takes 10 hours a week.
4. Railroad Engineering. Fall term, 10 hours a week.
5. Masonry Construction. Fall term, 7 hours a week.
6. Geodesy. Half of fall term, 5 hours a week.
7. Practical Astronomy. Half of fall term, 10 hours a week.
8. Bridges.
 (*a*) Bridge Analysis. Winter term, 5 hours a week.
 (*b*) Bridge Designing. Spring term, 5 hours a week.
9. Tunneling. Spring term, 5 hours a week.
10. Surveying. Spring term, 10 hours a week.

MUNICIPAL AND SANITARY ENGINEERING—

1. Road Engineering. Winter term, 5 hours a week.
2. Water Supply Engineering. Fall term, 5 hours a week.
3. Sewerage. Winter term. 5 hours a week.
4. Botany. Half of winter term. 10 hours a week.
5. Bacteriology. Fall term. 10 hours a week.

MINING ENGINEERING.

1. Mine Attack. Fall term, 5 hours a week.
2. Mine Surveying. Spring term, 5 hours a week.
3. Ore Dressing. Fall term, 10 hours a week.
4. Mine Engineering. Winter and spring terms, 10 hours a week.

ARCHITECTURE—

1. Shop Practice B. Fall. winter, and spring terms, 10 hours a week.
2. General Architectural Construction. Fall and winter terms, 10 hours a week.
3. Sanitary Construction. Spring term, 5 hours a week.
4. Architectural Drawing. Fall and winter terms, 10 hours a week.
5. History of Architecture. Winter and spring terms, 5 hours a week.
6. Roofs. Spring term, 10 hours a week.
7. Architectural Perspective. Fall term, 10 hours a week.
8. Superintendence, Estimates, and Specifications. Fall term, 5 hours a week.
9. Advanced Graphics. Fall term. 10 hours a week.
10. Heating and Ventilation. Winter term, 5 hours a week.
11. Architectural Designing. Winter and spring terms, 10 hours a week.
12. Esthetics of Architecture. Spring term, 10 hours a week.
13. Architectural Course in Artistic Drawing and Modeling. For second year students. Fall, winter, and spring terms, 10 hours a week.
14. Architectural Course in Artistic Drawing and Modeling. For fourth year students. Fall, winter, and spring terms, 10 hours a week.

MILITARY SCIENCE—

1. Drill Regulation for Infantry. Fall and winter terms, 1 hour a week.
2. Drill Practice. Two years, 2 hours a week.
3. For Officers of the Battalion. Six terms, 2 hours a week.

ORGANIZATION

I. The College of Agriculture:
- Course in Agriculture.
- Course in Veterinary Science.
- Course in Horticulture.
- Junior Course in Agriculture.

II. The College of Engineering:
- Course in Mechanical Engineering.
- Course in Electrical Engineering.
- Course in Civil Engineering.
- Course in Municipal and Sanitary Engineering.
- Course in Mining Engineering.
- Course in Architecture.
- Course in Architectural Engineering.

III. The College of Science:
- School of Chemistry.
- School of Natural Science.

IV. The College of Literature:
- School of English and Modern Languages.
- School of Ancient Languages.
- School of Philosophy and Pedagogy.

Additional Schools not distinctly attached to any of the colleges:
- School of Military Science.
- School of Art and Design.

V. Graduate School.

Vocal and instrumental music are also taught, but not as parts of any regular course.

Preparatory Classes.—To meet an urgent demand, the Trustees have temporarily provided for teaching the preparatory studies lying between the work of the elementary common schools and that of the University.

COLLEGE OF AGRICULTURE.

COURSES.

AGRICULTURE; VETERINARY SCIENCE; HORTICULTURE.

FACULTY.

Thomas J. Burrill, Ph.D., Acting Regent, Botany and Horticulture.
George E. Morrow, M.A., *Dean*, Agriculture.
Stephen A. Forbes, Ph.D., Zoölogy and Entomology.
Charles W. Rolfe, M.S., Geology.
Donald McIntosh, V.S., Veterinary Science.
Arthur W. Palmer, Sc.D., Chemistry.
Samuel W. Parr, M.S., Analytical Chemistry.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION IN THIS COLLEGE.

Edward Snyder, M.A., German.
James D. Crawford, M.A., History.
James H. Brownlee, M.A., Rhetoric and Oratory.
Nathaniel Butler, Jr., English Language and Literature.
Frank F. Frederick, Industrial Art and Design.
Elbridge R. Hills, First Lieut., U.S.A., Military Science.
M. R. Paradis, M.A., French.
Samuel W. Stratton, B.S., Physics.
George W. Myers, M.L., Mathematics.
George W. Parker, Wood Work.
Howard S. Brode, Zoölogy.

Object.

The College of Agriculture aims to give a liberal and practical education, based largely on the natural and physical sciences, but supplementing these with a list of technical or professional studies in which the application of science to the best modern practice of agriculture is carefully considered. The purpose is to prepare its

students to be intelligent and successful farmers or horticulturists; teachers of agriculture in schools or colleges, or through the agricultural press, or to be investigators in the agricultural experiment stations of the country. It also gives a good foundation in the study of veterinary science.

Shorter courses are provided for those who already have a good scientific education, and for those who desire to pursue the technical studies with special reference to their practical applications.

This college has the advantage of a close connection with the other colleges of the University, especially with the College of Science. The libraries, laboratories, museums, and collections of the University are a part of its equipment.

Methods of Instruction.

So far as is practicable, the professional studies are taught after a study of the sciences with which agriculture is most closely related. They are taught mainly by lectures, with use of text-books where suitable ones are available. Readings are prescribed in standard agricultural books and periodicals. Large use is made of the publications of agricultural experiment stations. Frequent written or oral discussion by the student of the principles taught is required. These are also illustrated by observations in the fields, stables, orchards, gardens, etc., of the University, or in the vicinity.

The constant aim is to aid the student in forming habits of careful and accurate observation and investigation; to lead him to seek the reasons for agricultural methods, as well as to learn rules of practice; to teach him how to use the sources of knowledge concerning agriculture; and to help him to become an intelligent, progressive citizen and business man.

Equipment.

The College has, for the illustration of practical agriculture, a stock farm of 400 acres, provided with a large stock barn fitted up with stables, pens, yards, etc.; also an experiment farm of 180 acres, furnished with all necessary apparatus to illustrate the problems of breeding and feeding. It has specimens of heavy draft, farm, and roadster horses, and herds of Shorthorn, Hereford, Holstein, and Jersey cattle, and of Poland-China swine.

The Agricultural Experiment Station, established as a department of the University, exhibits field experiments in testing the

different varieties and modes of culture of field crops, and in the comparison and treatment of soils. It carries on experiments in agriculture, horticulture, dairying, and in feeding animals of different ages and development upon the various kinds of food. In common with similar departments in the several agricultural colleges of the country, it attempts to create positive knowledge towards the development of an agricultural science. A dairy house fitted with a cream separator, apparatus for deep and shallow setting of milk, churns, etc., is used in illustration of dairy processes.

Surveying and drainage are illustrated by field practice, with instruments, and by models. Agricultural chemistry is pursued, in connection with laboratory practice, in the analysis of soils, fertilizers, foods, etc. The College has fine collections of soils, seeds, plants, implements, models, and skeletons of domestic animals, charts, and other apparatus, including a large number of models of agricultural machinery.

Upon the grounds devoted to the use of the college are: An apple orchard, containing numerous varieties, and planted in 1869; also many varieties of pears, cherries, grapes, and small fruits.

A forest tree plantation, embracing the most useful kinds of timber.

An arboretum, in which all hardy, indigenous, and exotic trees are planted as fast as they can be secured, and which now contains nearly one hundred varieties.

The ornamental grounds which surround the University buildings, contain about twenty acres, and are kept in neat and attractive style. These with all the adjuncts of trees and flowering shrubs, lawns, beds of flowers, and foliage plants, walks of different materials and styles of laying out, give illustration to the class room work in landscape gardening. A greenhouse contains a collection of plants of great value for the classes in floriculture and landscape gardening, besides furnishing students with practice in greenhouse management.

The extensive fruit plantations of the Agricultural Experiment Station give abundant opportunity for studies and illustrations in many horticultural lines, and add greatly to the effectiveness of class room work.

The cabinet contains a series of colored plaster casts of fruits prepared at the University; models of fruits and flowers by Auzoux, of Paris; collections of seeds of native and exotic plants; of specimens of native and foreign woods; of beneficial and injurious

insects, and specimens showing their work: numerous dry and alcoholic specimens and preparations; maps, charts, diagrams, drawings, etc.

The College has a supply of compound microscopes and apparatus, and students have opportunity to learn their use, and to make practical investigations with them. The herbarium is rich in specimens of useful and noxious plants, including many of the fungous parasites which cause disease to cultivated crops.

COURSES OF INSTRUCTION.

Agriculture.

1. Farm Equipment.—Careful consideration is given to the planning and methods of construction of farm buildings; to the division of the farm into fields; to a comparison of different methods of fencing, with methods of construction and care of each; to laying out, constructing, and maintaining roads. Especial attention is given to the improvement of the farm by drainage, the reasons for drainage, laying out drains, methods of leveling, estimating size of tile, and depth of drains best adapted for different situations being fully explained. Field practice accompanies the class room work. The selection, use, and care of farm implements and machinery receive full consideration. *Lectures and Reference Reading. Fall term, 10 hours a week.* Professor Morrow.

2. Animal Husbandry.—The leading principles of breeding and the practical methods of feeding and managing farm animals, horses, cattle, sheep, and swine, are discussed. The purpose served by food, and the best methods of feeding for the economical production of meat, dairy products, wool, etc., are explained with free use of the records of practice by successful breeders and feeders in this and other countries. The history, characteristics, and adaptations of all important breeds of farm animals are studied. Students are given the opportunity of carefully studying animals and judging them with reference to breed characteristics and their adaptations to different uses. Practice is given in study of pedigrees. *Lectures and Reference Reading. Winter term, 5 hours a week.* Professor Morrow.

. Rural Economy.—The relation of agriculture to other industries; the advantages and disadvantages of different systems, as stock rearing, dairying, grain farming; of specialties and general farming, and the circumstances which make each desirable, are discussed. The culture of farm crops, cereals, roots, grasses, etc, including choice of varieties, preparation and cultivation of the soil, harvesting and utilization of each, receives as full attention as time permits. *Lectures and Reference Reading. Winter term, 5 hours a week.* Professor MORROW.

History of Agriculture.—The development of agriculture, especially in comparatively recent times and in our own country, is studied with particular reference to the effects of climate, different phases of civilization and of legislation in advancing or retarding it. The history and characteristics of agricultural organizations of various classes are considered, and a survey is taken of agricultural literature. *Lectures and Reference Reading. Half of spring term, 5 hours a week.* Professor MORROW.

5. Rural Law.—The object of this study is to enable the student to familiarize himself with some fundamental principles of law and with the special laws which most directly affect the farmer. Tenure of real estate; laws relating to roads, fences, drainage, etc., as well as the most important parts of commercial law are considered. *Lectures and Reference Reading. Half of spring term, 5 hours a week.* Professor MORROW.

VETERINARY SCIENCE.

1. Anatomy and Physiology.—The anatomy and physiology of the domestic animals constitute the subjects of instruction for a term. The instruction is given by lectures aided by demonstrations with use of skeletons and models illustrating the details of structure and formation of parts. This is supplemented by the study of text-books. *Strangeway's Veterinary Anatomy; Smith's Physiology of the Domestic Animals. Fall term, 5 hours a week.* Professor MCINTOSH.

2. Principles and Practice of Veterinary Medicine.—This subject comprises veterinary medicine, surgery, and hygiene, and is taught by lectures and text-books, and illustrated by specimens of morbid anatomy, with observations and practice at the clinics. The latter are held at the veterinary infirmary where

a large number of animals are treated or operated upon once each week. Dissections and post mortems are made. *Williams's Practice of Veterinary Medicine and Surgery; Courtney's Practice of Veterinary Medicine and Surgery. Winter and spring terms, 5 hours a week.* Professor McIntosh.

3. Materia Medica.—The substances and agents used for the prevention or cure of disease and for the preservation of health are studied in this course. The instruction is given by lectures and text-books. In the illustrative collections are specimens of all the drugs used. *Dun's Veterinary Materia Medica; Wood's Human Materia Medica. Winter and spring terms, 5 hours a week.* Professor McIntosh.

Horticulture.

1. Fruit Culture.—Orchards, vineyards, small fruit plantations and their products, constitute the main subjects of this term's work. Lectures are given upon propogating, planting, and cultivating trees and vines; upon identifying, classifying, and preserving fruits, and upon diseases and remedies. Studies are made upon illustrative material in the laboratory, and visits to the orchards and plantations form a part of the instruction. *Fall term, 6 hours a week.* Professor Burrill.

2. Forestry.—This course embraces a study of forest trees and their uses, their natural distribution, and their artificial production. The relations of forests and climate are studied, and the general topics of forestry legislation and economy are discussed. *Lectures. Half of winter term, 5 hours a week.* Professor Burrill.

3. Plant Houses and House Plants.—This study includes gardening and landscape architecture; the methods of construction, heating, and ventilation, and general management of greenhouses, and the study of the kinds, propagation, growth, and care of flowering plants. Each student has practice in propagating by cuttings and otherwise, in potting and shifting, and in care of plants requiring various treatment. Insects and diseases, with the remedies, are thoroughly treated, and the means of securing vigor of growth and abundance of flowers are studied and illustrated by practice. *Henderson's Practical Floriculture. One-half of winter term, 7 hours a week.* Professor Burrill.

4. Gardens.—Kitchen and market gardens are made the first subjects of study, after which ornamental and landscape gardening occupies the time. *Henderson's Gardening for Profit; Long's Ornamental Gardening. Spring term, 5 hours a week.* Professor BURRILL.

5. Elements of Horticulture.—This is a minor course, intended for students who take but one term of horticultural work. The following topics are discussed: Orchard sites; the age of trees to plant; the season to plant; how to plant: what to plant; the management of the soil; pruning and care of trees; gathering and preserving fruit; diseases and injuries; the nursery; ornamental trees and shrubs; flower gardens; vegetable gardens, including propagating beds and houses; the vineyard and small fruits, and timber tree plantation. Students have instruction and practice in grafting, budding, propagation by cuttings, etc. *Lectures. Winter term, 6 hours a week.* Professor BURRILL.

The following subjects, offered to students in the College of Agriculture, are described elsewhere, as noted.

In College of Engineering—
Mathematics, 1, 3, 5; Physics, 1, or 2; Shop Practice, 1; Mineralogy, 1.

In College of Science—
Chemistry, 1, or 1, 6, 7; Botany, 1, 2, 3, 4 or 6; Zoölogy, 1, or 5; Entomology, 1; Physiology, 1; Geology, 1, or 5; General Biology, 1.

In College of Literature—
History, 3; Political Economy, 1; Philosophy, 1; Pedagogy, 2, or 5, or 2 and 3, or 5 and 6; Themes and Elocution, 1; German, 1 and 2, or 4; French, 1 and 2, or 4.

In School of Military Science—
Military Science, 1, 2.

CLASSIFICATION OF STUDIES.

For the degree of Bachelor of Science in the College of Agriculture 40 credits are required, each given for the satisfactory completion of the study of a required or elective subject for one term, five exercises a week. Of these credits 24 must be obtained by pursuing the required studies each for the minimum time named

below. The other 17 credits may be obtained by pursuing further required studies, or by the prosecution of elective studies.

Students who have completed a four years' course of study in the College of Science may take the professional agricultural studies in one year; and those who have followed a course for two years may take the professional studies, and other scientific or general studies in the last two years of their course.

Students especially interested in animal husbandry or veterinary science may omit some of the horticultural studies; and those preparing for horticultural work may omit veterinary specialties.

REQUIRED STUDIES.	ELECTIVE STUDIES.
Agriculture—3 to 4 terms.	Bacteriology—1 term.
Horticulture—1 to 3 terms.	Entomology—2 terms.
Veterinary Science—1 to 4 terms.	General Biology—1 term.
Thesis—1 to 2 terms.	Geology—1 to 2 terms.
Botany—1 to 6 terms.	Mineralogy—1 term.
Chemistry—3 to 6 terms.	Physiology—1 term.
Physics—1 to 3 terms.	Zoölogy—1 to 3 terms.
Mathematics—2 to 3 terms.	Meteorology—½ term.
French—3 or 6 terms.	Anthropology—½ term.
German—3 or 6 terms	Mental Science—1 term.
Themes and Elocution—2 terms.	Pedagogy—1 to 2 terms.
Military—2 terms.	Drawing—1 to 3 terms.
Political Economy—1 term.	French—3 terms.
	German—3 terms.
	Constitutional History—1 term.
	Shop Practice—1 term.

Suggested Courses of Study in Agriculture.

For the guidance of students in the selection of studies the following courses are offered. The first year's work, at least, should be taken as laid down in one of these courses, after which free selection may be made within the limits of the prescribed lists of required and elective subjects. Close correspondence exists for the first two years between these courses and those of the College of Science. The special professional subjects occur in the third and fourth years, or in the fourth alone.

Course 1 is arranged with nearly equal amounts of time given to each of the sciences, and is adapted to students who do not wish to

specialize in any one of these subjects. Courses 2 and 3 may be chosen by those who desire to give more attention to chemistry; course 4 by those who wish to make botanical studies a specialty; and course 5 by those who take a year's work in horticulture.

COURSE 1.

FIRST YEAR.

1. Chemistry; Mathematics; Physiology; Military.
2. Chemistry; Mathematics; Drawing; Military.
3. Chemistry; Astronomy; Drawing: Military.

SECOND YEAR.

1. Botany; Physics; French; Military.
2. Botany; Physics; French; Military.
3. Botany; Physics; French; Military.

THIRD YEAR.

1. Zoölogy; Mineralogy; German; Themes and Elocution.
2. Entomology; Geology; German; Themes and Elocution.
3. Entomology; Geology; German; Themes and Elocution.

FOURTH YEAR.

1. Farm Equipment; Horticulture; Mental Science; Thesis.
2. Rural Economy; Veterinary Science; Animal Husbandry.
3. History of Agriculture and Rural Law; Veterinary Science; Political Economy.

COURSE 2.

FIRST YEAR.

1. Chemistry; Mathematics; French; Military.
2. Chemistry; Mathematics; French; Military.
3. Chemistry; Mathematics; French; Military.

SECOND YEAR.

1. Chemistry; Physiology: German; Military.
2. Chemistry; Zoölogy; German; Military.
3. Chemistry: Botany; German; Military.

THIRD YEAR.

1. Physics; German; Veterinary Science; Themes and Elocution.
2. Physics; German; Veterinary Science; Themes and Elocution.
3. Physics: Geology; Veterinary Science; Themes and Elocution.

FOURTH YEAR.

1. Farm Equipment; Mental Science; Horticulture; Thesis.
2. Rural Economy; Animal Husbandry; Constitutional History.
3. History of Agriculture and Rural Law; Vegetable Physiology; Political Economy.

COURSE 3.

FIRST YEAR.

1. Chemistry; Mathematics; French; Military.
2. Chemistry; Mathematics; French; Military.
3. Chemistry; Mathematics; French; Military.

SECOND YEAR.

1. Chemistry; Physics; German; Military.
2. Chemistry; Physics; German; Military.
3. Chemistry; Physics; German; Military.

THIRD YEAR.

1. Chemistry; Botany; Physiology; Themes and Elocution.
2. Chemistry; Botany; Zoölogy; Themes and Elocution.
3. Chemistry; Botany; Geology; Themes and Elocution.

FOURTH YEAR.

1. Farm Equipment; Horticulture; Mental Science; Thesis.
2. Rural Economy; Veterinary Science; Animal Husbandry.
3. History of Agriculture and Rural Law; Veterinary Science; Political Economy.

COURSE 4.

FIRST YEAR.

1. Chemistry; Mathematics; French; Military.
2. Chemistry; Mathematics; French; Military.
3. Chemistry; Mathematics; French; Military.

SECOND YEAR.

1. Botany; Physics; German; Military.
2. Botany; Physics; German; Milltary.
3. Botany; Physics; German; Military.

THIRD YEAR.

1. Bacteriology; Zoölogy; Veterinary Science; Themes and Elocution.
2. Fungi; Zoölogy; Veterinary Science; Themes and Elocution.
3. Plant Reproduction; Zoölogy: Veterinary Science; Themes and Elocution.

FOURTH YEAR.

1. Farm Equipment; Horticulture; Mental Science; Thesis.
2. Rural Economy: Entomology; Animal Husbandry.
3. History of Agriculture and Rural Law; Entomology; Political Economy.

COURSE 5.

FIRST YEAR.

1. Chemistry; Mathematics; French; Military.
2. Chemistry: Mathematics: French: Military.
3. Chemistry; Mathematics; French; Military.

SECOND YEAR.

1. Botany; Physics; German; Military.
2. Botany; Physics; German; Military.
3. Botany; Physics; German; Military.

THIRD YEAR.

1. Bacteriology; Zoölogy; Physiology; Themes and Elocution.
2. Fungi; Zoölogy; Entomology; Theme and Elocution.
3. Plant Reproduction: Zoölogy: Entomology; Themes and Elocution.

FOURTH YEAR.

1. Fruit Culture: Farm Equipment; Mental Science.
2. Forestry and Plant Houses; Rural Economy; Constitutional History.
3. Gardens: History of Agriculture and Rural Law; Political Economy.

JUNIOR COURSE IN AGRICULTURE.

A two years' course has been arranged for those who desire some knowledge of the physical and natural sciences as well as the professional agricultural studies. For admission to this course students should not be less than eighteen years of age, and should have at least a good common school education.

Students of sufficient age and attainments may take the professional studies of this course in one year. Horticultural studies may be substituted for veterinary science if desired.

Young farmers, or others, who can give but a few months to school preparation, will be admitted in the winter term without special examination, to the lectures and class exercises on farm crops, farm animals, and the more important diseases of animals.

The two years' course is arranged as follows:

Junior Course in Agriculture.

FIRST YEAR.

1. Chemistry: Natural Philosophy; Physiology and Algebra.
2. Chemistry; Zoölogy: English, or Free Hand Drawing.
3. Chemistry; Botany; English, or Free Hand Drawing.

SECOND YEAR.

1. Farm Equipment and Management: Horticulture; Botany.
2. Animal Husbandry: Veterinary Science: Rural Economy, or Entomology.
3. History of Agriculture and Rural Law: Veterinary Science: Vegetable Physiology, or Entomology.

COLLEGE OF ENGINEERING.

COURSES.

MECHANICAL ENGINEERING; ELECTRICAL ENGINEERING; CIVIL ENGINEERING; MUNICIPAL AND SANITARY ENGINEERING; MINING ENGINEERING; ARCHITECTURE; ARCHITECTURAL ENGINEERING.

FACULTY.

THOMAS J. BURRILL, PH.D., ACTING REGENT, Botany.
N. CLIFFORD RICKER, M.Arch., *Dean*, Architecture.
SAMUEL W. SHATTUCK, C.E., Mathematics.
IRA O. BAKER, C.E., Civil Engineering.
ARTHUR N. TALBOT, C.E., Municipal Engineering and Mechanics.
FRANK F. FREDERICK, Industrial Art and Design.
SAMUEL W. STRATTON, B.S., Electrical Engineering and Physics.
WALTER J. BALDWIN, B.S., Mining Engineering.
CHARLES W. SCRIBNER, A. B., M.E., Mechanical Engineering.
GEORGE W. MYERS, M.L., Mathematics.
GEORGE W. PARKER, Wood Work.
RUFUS ANDERSON, M.E., Iron Work.
JAMES M. WHITE, B.S., Architecture.
EDWARD S. KEENE, B.S., Mechanical Engineering.
JOHN H. POWELL, B.S., General Engineering Drawing.
GLEN M. HOBBS, Physical Laboratory.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION IN THIS COLLEGE.

EDWARD SNYDER, M.A., German.
JAMES D. CRAWFORD, M.A., History.
JAMES H. BROWNLEE, M.A., Rhetoric and Oratory.
CHARLES W. ROLFE, M.S., Geology.
NATHANIEL BUTLER, JR., M.A., English Literature.
ARTHUR W. PALMER, SC.D., Chemistry.
ELBRIDGE R. HILLS, First Lieut., U.S.A., Military Science.
SAMUEL W. PARR, M.S., Chemistry.
M. R. PARADIS, M.A., French.

GENERAL OBJECT OF THE COLLEGE.

The purpose of the College of Engineering is thoroughly to educate and prepare engineers and architects for their future professional courses. Its aim must therefore be two-fold—general and technical. A considerable proportion of the course of study must be devoted to general and literary work, since a graduate is expected now to arrange his ideas in clear order, and to write or speak effectively, whenever it becomes necessary. Professional success frequently depends upon this power far more than is commonly supposed.

Moreover there is an ever-increasing fund of general and scientific knowledge with which any educated man is expected to be conversant, if he desires to retain the esteem of his associates and clients. Much of the most valuable material is yet locked up in foreign languages, and their keys must be acquired by patient study and practice. Scarcely a single science is not at some time useful to the professional man, and some of them, like mathematics or physics, are so intimately interwoven with the different branches of technical knowledge, as to be practically indispensable, and so require a more thorough mastery than is necessary to the literary man. It might appear that this general training would alone be sufficient to absorb the entire attention of the student during his whole course, but not less than one-half his time must be given to purely technical training, and the acquiring of a professional capital, or stock of information and knowledge of details, which is almost limitless in its demands and possibilities.

The methods employed for embodying new ideas in drawings, intelligible to other professional men and to mechanics, must likewise be acquired.

A knowledge of the latest results of scientific experiments is likewise essential, requiring wide reading by some one, either student or professor. Engineering knowledge must be fresh, to be valuable, since ideas and methods are quickly supplanted by improved ones, and become useless except as mile-stones of progress. Consequently the most valuable part of this professional knowledge can never be crystallized in text-books, but must be drawn from the mental stores of the teacher.

GENERAL METHODS OF INSTRUCTION.

Whenever suitable text books can be found they are employed, because saving much time in acquiring facts and data, and because

such books become doubly valuable for later reference when enriched by notes and additions. But to arouse and awaken the enthusiasm of the student, occasional or stated lectures are necessary, and these are fully illustrated by sketches, diagrams, drawings, and photographs of executed work. They are frequently used in the advanced classes, partly because the deficiency of text books is there most apparent. Additional courses of extended reading are marked out by references to the University library, so that each student may enjoy the greatest possible benefit from the course of instruction. In all courses of study offered by the College, drawing in its manifold forms and uses, is made of especial importance both in its use and its modes of execution.

TESTING LABORATORY.

The testing laboratory has a Riehle testing machine of 100,000 pounds capacity, a smaller apparatus for testing beams, a Riehle cement testing machine, a stone grinding machine, a rattler, for abrasion tests of stone and brick, with apparatus for making all necessary measurements and observations, molds, and standard sieves for cement, etc. The laboratory is fitted up as a working laboratory where students may acquire such practice in experimental work as engineers are called upon to perform, as well for the purpose of illustrating principles as for use in original investigation. The ordinary work includes testing metals, wooden beams, cement briquettes, and stone and brick.

The hydraulic laboratory includes elevated tank and stand-pipe, steam pumps for giving high pressure, tanks for measuring flow of water, pressure gauges, meters, water motor, turbine, and other apparatus for experiments with orifices, weirs, etc. The experiments are made in connection with the regular class instruction.

COMPUTING APPARATUS.

A collection of machines and apparatus for abbreviating computations and especially for use in the calculation of tables, includes the following instruments:

A Thomas's 10-place arithmometer, giving products of numbers to 20 places. This is the largest size manufactured, imported especially for the University, and is probably as convenient and accurate as any computing machine yet invented. It performs addition, subtraction, multiplication, and division, and is particularly useful

in calculating or verifying numerical tables. Two Thacher's computing scales, for performing multiplication, division, squaring, and extraction of square root. This instrument is sufficiently accurate for almost all purposes, and can be used more rapidly than the last. An Amsler's polar planimeter for measuring the area of figures of any form, and principally employed in graphic statics, or by mechanical engineers for measuring indicator diagrams. A Webb's adder for performing addition only.

COURSES OF INSTRUCTION.

Mathematics.

The instruction offered in pure mathematics constitutes two distinct lines of study differing in extent, partially in subject matter, and in the method of presentation. The first is for students in the Colleges of Agriculture, Science, and Literature, and occupies one year, beginning in the fall. It has for its object to promote habits of mental concentration and continuity of thought, to develop the capacity, to form and combine abstract conceptions, and to cultivate the deductive reason. The second is primarily offered to students in the College of Engineering and occupies two years, also beginning in the fall. In addition to the educational object just given, the purpose is to enable the student to meet the requirements of his engineering studies. The greater part of the time is necessarily taken up with the theory and its applications to geometrical magnitudes.

The first line of study includes the courses numbered 1, 3, and 5; the second, courses 2, 4, 6, and 7.

1. Advanced Algebra.—For students in the Colleges of Agriculture. Science, and Literature. Functions and their notation; series and the theories of limits: imaginary quantities; general theory of equations. Topical reviews of all preceding algebraic processes. *Wells's University Algebra. Fall term, 5 hours a week.* Professor Myers.

2. Advanced Algebra.—For students in the College of Engineering. Principles of small practical value are subordinated to those of higher utility. Accuracy and dispatch in the use of principles are continually emphasized. A topical review of principles of elementary algebra is made from time to time. This review is sometimes made by requiring students to solve practical prob-

lems illustrative of principles not well understood. Some of the most important subjects in which instruction is given are functions and their notation; the progressions; theory of numbers; permutations and combinations; probabilities; convergency and divergency of series; summation of series; undetermined coefficients; doctrine of limits; logarithms and general theory of equations. *Newcomb's College Algebra. Fall term, 5 hours a week.* Professor MYERS.

3. Trigonometry.—For students in the Colleges of Agriculture, Science, and Literature. Trigonometry, plane and spherical; fundamental relations between the trigonometrical functions of an angle or arc; relations between the functions of different angles or arcs; construction and use of tables; solution of triangles; angles as functions of sides, and sides as functions of angles; applications. *Wells's Trigonometry. Winter term, 5 hours a week.* Professor MYERS.

   Required: Math., 1.

4. Trigonometry.—For students in College of Engineering. The ratio system is studied chiefly, but the necessary connection between it and the line system is carefully proved and illustrated. Students are frequently required to demonstrate the same proposition, using first the line values, then the ratio values of the functions. The subjects taught are the circular measurement of angles, general formulæ of plane and spherical trigonometry, relations between functions of multiples of 90° plus or minus and angle, solution of right and oblique plane triangles, of spherical right and oblique triangles, Napier's rules and analogies, and practical applications of principles to the solutions of astronomical problems. Teaching is in part by text book, and in part by assigning principles to be demonstrated and problems to be solved outside of the text book. *Wells's Essentials of Trigonometry. Winter term, 5 hours a week.* Professor MYERS.

   Required: Math., 2.

5. Conic Sections (geometrical method).—Definitions and general properties of the ellipse, hyperbola, and parabola; curvature of the conic sections; elements of analytical geometry. Properties and relations of the point and right line in a plane: of the conic sections. *Coffin's Sections and Analytical Geometry. Spring term, 5 hours a week.* Professor MYERS.

   Required: Math., 1, 3.

6. Analytical Geometry.—The aim is to acquaint the student with analytical methods of investigation, and to familiarize him with some of the most recent developments in synthetic geometry; to make him more skillful in the use of algebraic processes, especially as a means of demonstrating geometric properties of loci. Subjects considered are the elementary theory of the point and right line in a plane; use of abbreviated notation; elementary theory of the conic sections, their equations and properties developed analytically; poles and polars: synthetic geometry of the circle, and the discussion of the general equation of the second degree. Written work in plotting and discussing loci from their equations is required from time to time. *Newcomb's Analytic Geometry. Spring term, 5 hours a week.* Professor Myers.

Required: Math., 2, 4.

7. Differential Calculus.—Rules for the differentiation of functions of a single variable; successive differentiation; development of functions; maxima and minima of functions of a single variable; differentials of an arc, plane area, surface and volume of revolution; elementary discussion of higher plane curves; the spirals, logarithmic curve, trochoid, etc.; algebraic curves.

Integral Calculus. Integration of elementary forms and rational fractions; rectification of plane curves; quadrature of plane areas and surfaces of revolution; cubature of solids of revolution.

Advanced Analytical Geometry. Loci in space; in point, right line, plane and surfaces of the second order.

Advanced Calculus. Development of the second state of functions of any number of variables; differential equations; maxima and minima of functions of two or more variables; construction and discussion of curves and surfaces; integration of irrational and transcendental differentials and of differential equations of the higher orders and degree; applications; elements of elliptic integrals. *Byerly's Differential Calculus; Byerly's Integral Calculus; Newcomb's Analytic Geometry. Fall, winter, and spring terms, 5 hours a week.* Professor Shattuck.

Required: Math., 2, 4, 5, 6.

Theoretical and Applied Mechanics.

1. Analytical Mechanics.—The mechanics of engineering rather than that of astronomy and physics is here considered, with a view to the future needs of the student of engineering. In addition to fixing the fundamental concepts and demonstrating the general principles of equilibrium and motion, application of principles and methods is made to numerous and varied engineering problems in such a way that the student must discriminate in the use of data and in the statement of conditions, and so obtain a working knowledge of the subject. The methods of the calculus are used whenever preferable. As mathematical processes and forms express most readily and quickly the rules and methods of work, the training in this direction is important. This subject requires a thorough working knowledge of the mathematics preceding it in the course.

   Outline of the subject: Nature and measure of force; composition and resolution of forces; moments; conditions of equilibrium; resultant of systems; of forces; center of gravity; moment of inertia; rectilinear and curvilinear motion, and the relation between such motion and the constraining and accelerating forces; dynamics of a rigid body; momentum and impact; work, energy, and power; mechanical advantage; friction. *Bowser's Analytical Mechanics. Fall term, 5 hours a week.* Professor Talbot.

   Required: Math., 2, 4, 5, 6, 7.

2. Resistance of Materials.—In the treatment of this subject it is the aim to give the student a thorough training in the elementary principles of the mechanics of materials, to follow with such experiments and investigations in the testing laboratory as tend to verify the experimental laws, and to add such problems in ordinary engineering practice as will train the student in the use of his knowledge.

   Outline of the subject: Elasticity of materials; stresses and strains; experimental laws; working strength for different materials; resistance of pipes and riveted joints; bending and resisting moment, shear and elastic curve of cantilever, simple, restrained, and continuous beams; column formulas; torsion, and shafts; maximum internal stresses in beams; fatigue of metals; working strength for repeated stresses; resilience; reliability of the common theory of flexure as shown by actual

experiment; design and strength of rolled and built beams and columns; specifications for materials and methods of testing. *Merriman's Mechanics of Materials. Winter term, 7 hours a week.* Professor TALBOT.

Required: Math., 2, 4, 6, 7; Mechanics, 1.

3. Hydraulics.—In hydraulics the instruction is by text book and laboratory work.

The subject covers the following: Weight and pressure of water; head; center of pressure, velocity and discharge through orifices, weirs, tubes, pipes, conduits, canals, and rivers; measurement of pressure, velocity, and discharge; water power. *Merriman's Hydraulics. Spring term, 7 hours a week.* Professor TALBOT.

Required: Math., 2, 4, 6, 7; Mechanics, 1, 2.

GENERAL ENGINEERING DRAWING.

1. Elements of Draughting.—This term's work is designed as a general preparation for draughting in all branches. Its aim is first, to teach the accurate and intelligent use of instruments and materials; and second, to start the student upon his work with those neat and orderly habits that are invaluable to the competent draughtsman.

The instruction is given by text books, lectures, and reference to books in the University library. The problems are arranged so as to be of the most practical benefit to the student and, instead of being copies of similar problems, are designed to throw him upon his own ingenuity in applying his knowledge of principles learned. This work includes geometrical constructions; orthographic, isometric, and cabinet projections of objects from models or given data; sections, drawings finished in line shading and water colors; in all about thirty plates. *Faunce's Mechanical Drawing; Lectures and Blue Print. Fall term, 10 hours a week.* Mr. POWELL.

2. Descriptive Geometry.—The first term's work in this study includes problems on the point, line, and plane, some of the simpler geometrical solids, and shades and shadows. The second terms's work takes up plane, single-curved, double-curved, and warped surfaces; the generation and development of the same;

sections, and intersections. The application of principles and methods in numerous and varied practical problems is a large part of the work in each term, comprising in all the drawing of about thirty-five plates. *Woolf's Descriptive Geometry. Half of winter term and the spring term, 10 hours a week.* Mr. Powell.

Required: General Engineering Drawing, 1.

3. Lettering.—Plain and ornamental alphabets; round and stump writing; titles and title pages. *Half of winter term, 10 hours a week.* Mr. Powell.

   Required: General Engineering Drawing, 1.

Physics.

The department of physics has for its quarters a large lecture room provided with conveniences for lecture illustrations, such as projecting lantern, switch board, resistances, motors, etc.; also a laboratory for experimental work, a photometry room, and a photographic dark room.

The equipment consists of a line of apparatus selected from the best makers with especial reference to lecture illustrations and quantative laboratory work. Large additions have lately been made to the apparatus in this department. The equipment of the electrical laboratory adds greatly to the facilities for the treatment of electricity in the general physics.

1. Major Course.—This course is provided for the students in the College of Engineering and is required of them; it is also open to others wishing a more complete course in physics than course 2.

   (*a*) Elementary Mechanics and Sound. The mechanics is made introductory to the study of general physics. The centimetre-gramme-second system is introduced and methods of accurate measurement discussed. Sound is taken up and thoroughly treated as an introduction to the study of wave motions in heat, light, and electricity.

   (*b*) Heat and Light. The theory of heat is studied and special attention is paid to the various heat measurements and measuring apparatus, including calorimetry.

   In light the ordinary phenomena are considered and explained according to the wave theory. The action of lenses and their various combinations in the different optical instruments are discussed.

(*c*) Electricity and Magnetism. Static electricity is first taken up and especial attention is paid to the theory of potential, the character of the electrical discharge, and the theory of instruments used in static electrical measurements. Current electricity and magnetism follow, in which the laws governing the flow of electricity, the effects of the current, and its measurement are fully considered. The more important applications of current electricity are studied and the idea of the magnetic circuit introduced with magnetism.

(*d*) Laboratory Exercises in Precision of Measurement are designed to acquaint the student with the various forms of accurate measuring apparatus and their use, including the vernier, micrometer, comparator, the physical balances, etc. The data taken in the laboratory are afterward to be written up and presented at the end of the term in the form of an illustrated note book.

Experiments in heat are given, including the determination of coefficients of expansion, latent and specific heats, the testing of mercurial and air thermometers, etc. Experiments in light include the simple photometric measurements, the determination of indices of refraction, and constants of lenses and mirrors.

Practice in electricity and magnetism consists of the elementary electrical measurements. and is designed to impress the student with the principles taken up in course 2. It is preparatory to the laboratory practice in electrical engineering. *Ganot's Physics. Fall, winter, and spring terms, 6 hours a week.* Professor STRATTON.

Required: Math.. 3, or 4.

2. Minor Course.—This course is designed to cover the general subject of physics, and consists of lectures, text book and reference work. The student is required to be well prepared in elementary physics and to have had trigonometry. *Olmstead's College Philosophy. Winter term, 5 hours a week.* Professor STRATTON.

Required: Math., 3, or 4.

DESCRIPTIVE ASTRONOMY.

1. Descriptive Astronomy.—For students in Colleges of Agriculture, Science, and Literature. The aim of this course is to supply

(1) a general knowledge of the facts of astronomy, (2) a clear conception of the principles underlying them, and (3) an understanding of the methods of arriving at these facts. The subjects considered are the doctrine of the sphere, the heavenly bodies, their nature, dimensions, characteristics, and the influence they exert upon each other by their attractions, radiation, or any other ascertainable cause. The most important instruments of astronomical research are explained; and, during favorable weather, the sun, moon, and planets will be studied with the equatorial telescope. Methods of spectroscopic research are discussed and, as far as possible, illustrated. Illustrative charts and lectures are also occasionally resorted to. *Newcomb and Holden's Astronomy, Advanced Course. Spring term, 5 hours a week.* Professor MYERS.

Required: Math., 3.

2. Descriptive Astronomy.—For students of the College of Engineering. This course comprises the subject matter of course 1 and, in addition, some of the fundamental principles of celestial mechanics. Astronomy is here taught with a view to its utility rather than as a matter of general information. Students are required to work out problems in latitude and longitude, to deduce from the principles of mechanics formulæ for weighing the masses of the heavenly bodies against each other, to solve problems involving corrections for parallax, refraction, dip of the horizon, and to determine mathematically the distances, dimensions, and orbits of the bodies of the solar system. When favorable weather admits, the equatorial telescope is in use by students, and time is spent in the location and study of the constellations. Students are directed to make readings on astronomical subjects of value to be found in astronomical publications in the library, and are frequently required to recite upon them. Though no attempt is made to teach practical astronomy, which is taught as a specialty in civil engineering, the practical features of descriptive astronomy are kept uppermost in this course. *Young's General Astronomy. Spring term, 5 hours a week.* Professor MYERS.

Required: Math., 4; Physics, 1; Theoretical and Applied Mechanics, 1.

Mechanical Engineering.

1. Shop Practice A.—The course of elementary shop practice has been carefully arranged to familiarize the student with the forms of the parts of machines, and the mode of producing them. He is made familiar with all the ordinary cutting tools for iron or wood; with the form and condition for most effective work; with the machines and appliances by which they are put in action, and the instruments by which desired dimensions of product are obtained.

   (*a*) Exercises preparatory to pattern making in wood, consisting of planing, chiseling, boxing, sawing, turning, etc.; pieces are combined by mortise, dovetail, and glue joints. Finally, finished patterns are made.

   (*b*) Exercises in chipping and filing, in which true surfaces are produced with the cold chisel and file. After the hand and eye are sufficiently trained, fitting is begun, and the square, bevel, rule, compasses, and other auxiliary bench tools are used. Pieces are then fitted together by the file, with surfaces carefully finished.

   (*c*) Blacksmithing, including such operations as drawing, upsetting, punching, welding, tempering, etc.

   (*d*) Elementary exercises in machine tool work, in which the student becomes familiar with the various machine tools, such as engine lathes, shapers, planers, etc.

   (*e*) Exercises in molding and casting.

   (*f*) Machine tool work executed with especial reference to finish and sizes, using calipers, scales, gauges, etc. *Fall, winter, and spring terms, 10 hours a week.* Mr. Anderson.

2. Mechanical Drawing and Construction.—In this course the student is taught the methods peculiar to mechanical drawing. A complete set of drawings is made of some machine or parts of machines, and serves as working drawings for the shop work of the course. The time is divided between the drawing room and the machine shop. *Fall, winter, and spring terms, 13 hours a week.* Mr. Anderson.

   Required: General Engineering Drawing, 1, 2, 3.

3. Mechanism.—In this course the student takes up the parts of machines with reference to the production of required motions. The various forms of gear wheels, cams, link work, etc., are

studied. Finished drawings are made, involving the more important problems. *Stahl and Woods's Principles of Mechanism. Fall term, 10 hours a week.* Professor SCRIBNER.

Required: Math., 2, 4, 6.

4. (*a*) Engineering Materials.—The work of this course includes the characteristic properties of the materials used in construction, and their preparation. The nature and value of fuels for various purposes are also considered.

(*b*) Steam Engineering. This subject is preparatory to the course on heat engines. The steam engine and boiler are taken up with reference to design, uses to which the different kinds are best suited, action of the parts, and general rules governing the selection and installation. *Winter term, 10 hours a week.* Professor SCRIBNER.

Required: Shop Practice A; Math., 2, 4, 6; General Engineering Drawing, 1, 2.

5. Mechanics of Machinery.—In this course the dimensions of the various parts of machines are computed, the problems relative to shafting, belts, etc., are also taken up. *Unwin's Machine Design. Spring term, 5 hours a week.* Professor SCRIBNER.

Required: Shop Practice A; Math., 2, 4, 6.

6. Heat Engines.—This course includes the problems of thermodynamics that arise in the consideration of steam, gas, and other heat engines. *Peabody's Thermo-Dynamics. Fall term, 5 hours a week.* Professor SCRIBNER.

Required: Math., 2, 6, 7; General Engineering Drawing, 1, 2, 3; Shop Practice A; Mechanical Engineering, 5.

7. Machine Design.—In this course the designing of a steam engine or other machine is undertaken, the parts of which are carefully computed and designed in accordance with the best scientific practice. *Fall term, 10 hours a week.* Professor SCRIBNER.

Required: Math., 2, 4, 6, 7; General Engineering Drawing, 1, 2, 3; Mechanical Engineering, 1, 2, 3, 4, 5.

8. Hydraulic Engines and Wind Wheels.—This is a study of the theory and practice of turbine and other water motors. Wind wheels are also considered. *Bodmer's Hydraulic Engines. Winter term, 5 hours a week.* Professor SCRIBNER.

Required: Math., 2, 4, 6, 7; General Engineering Drawing, 1, 2, 3; Mechanical Engineering, 1, 2, 3, 4, 5, 6.

9. Mechanical Laboratory.—The work of this course in the winter term is designed to give the student practical experience in the testing of steam engines and boilers. In the spring term the student takes up some special line of work as seems best suited to his needs. *Winter and spring terms, 10 hours a week.* Professor SCRIBNER.

Required: Math., 2, 4, 6, 7: General Engineering Drawing, 1, 2, 3; Mechanical Engineering 1, 2, 3, 4, 5, 6.

10. Estimates.—In this course estimate are made of the cost of power and heating plants, including the various forms of contracts and specifications. *Spring term, 5 hours a week.* Professor SCRIBNER.

Required: Math., 2, 4, 6; General Engineering Drawing, 1, 2, 3; Mechanical Engineering, 1.

ELECTRICAL ENGINEERING.

1. Electrical Measurements.—This course is designed to bring before the student the systems of electrical units, together with the ordinary problems of electrical measurement and measuring apparatus.

(*a*) Lectures twice a week upon the theory of instruments, electrical units, and theory of electricity.

(*b*) Laboratory work consisting of the determination of galvanometer constants, measurements of resistances by the various Wheatstone bridge methods, electro-motive force, and current measurements. *Stewart and Gee's Electricity and Magnetism; Kempe's Hand Book of Electrical Testing. Spring term, 10 hours a week.* Professor STRATTON.

Required: Physics, 1.

2. Primary and Secondary Batteries.

(*a*) Lectures upon the theory of primary and secondary batteries, and electrolysis.

(*b*) Laboratory practice. This follows 1 (*b*), and includes the testing and selection of primary batteries for special purposes, the measurement of the internal resistance, polarization and electro-motive force by the condenser and other accurate methods, the testing of secondary batteries for efficiency, and the changes during charge and discharge. *Carhart's Primary Batteries; Reynier's Voltaic Accumulators. Fall term, 10 hours a week.* Professor STRATTON.

Required: Physics, 1: Electrical Engineering, 1.

3. Electrical Laboratory.—This conrse is essentially a course of laboratory work, but lectures may be given or text book work assigned, as is thought best. It includes the measurement of high resistances, cable and line testing, measurements of capacity, the standardizing of ammeters and voltmeters, and electrometer work. The work of the course is taken up with special reference to accuracy and methods of precision. *Winter term, 10 hours a week.* Professor STRATTON.

   Required: Physics, 1; Electrical Engineering, 1, 2.

4. Electro-Magnetism and Dynamo-Electric Machinery.—(*a*) Lectures and text book work. The theory, design, and classification of dynamo-electric machines and motors is considered, together with the efficiency and methods of governing constant current and constant potential machines.

   (*b*) Laboratory work, including the testing of dynamos and motors for characteristics, efficiency, regulation, etc. *Thompson's Dynamo-Electric Machines, and Thompson's Lectures upon the Electro-Magnet. Winter term, 10 hours a week.* Professor STRATTON.

   Required: Physics, 1; Electrical Engineering, 1.

5. Alternating Currents and Machines.—(*a*) Lectures and text book work upon the generation and application of alternating currents, the theory of converters, and the effect of the alternating current.

   (*b*) Laboratory practice, consisting of the measurement of the alternating current and testing of alternating current machines. *Fleming's Alternate Current Transformer. Spring term, 10 hours a week.* Professor STRATTON.

   Required: Physics, 1; Electrical Engineering, 1, 2, 3.

6. The Installation of Light and Power Plants.—(*a*) Electric Lighting. Lectures, and Notes. This includes the methods of wiring for arc and incandescent lighting, wiring, rules and regulations, and estimates on the cost of plants.

   (*b*) Electrical Distribution of Power. The distribution of power is taken up with especial regard to the electric railway, including estimates. *Spring term, 6 hours a week.* Professor STRATTON.

   Required: Physics, 1; Electrical Engineering, 1, 4.

7. Photometry.—Laboratory Work from Notes. This includes the problems of photometry, as found in connection with arc and incandescent electric lights. *Spring term, 4 hours a week.* Professor STRATTON.

   Required: Physics, 1; Electrical Engineering, 1, 2, 3.

CIVIL ENGINEERING.

1. Land Surveying.—Areas and distances by chain, compass, and plane table; U. S. public land surveys, including legal points involved in the re-establishment of boundaries; magnetic variation and determination of true meridian. The students solve numerous problems in the field with instruments. To facilitate practice in surveying, an area has been specially prepared in which the difficulties of plane surveying are presented to the beginner as he is able to meet them, and where he is taught practical methods of overcoming them. All possible distances, directions, areas, and elevations are accurately known; and hence the instructor knows beforehand the precise result which the student should obtain. This is an incentive to the student, and enables the teacher to show him the degree of accuracy attained, and also to point out errors. *Bellows and Hodgman's Surveyor's Manual. Fall term, 10 hours a week.* Professor BAKER.

   Required: General Engineering Drawing, 1; Math., 4.

2. Topographical Drawing and Surveying.—Topographical drawing is given during the bad weather of the winter term. The student spends about half a term making the standard topographical symbols, and in taking the data for, and making. a map. This and transit surveying and leveling making one credit.

   During the spring term Topographical surveying is taught, in which students solve problems with the plane table and the stadia, and make a topographical survey and plot the notes. *Winter and spring terms, with course 3 requires 10 hours a week.* Professor BAKER.

   Required: Math., 4; General Engineering Drawing, 1, 2, 3.

3. Transit Surveying and Leveling.—Construction, adjustment, and use of the transit and level; angles, inaccessible distances, and areas with the transit; profiles and contours with the level. The department is provided with the instruments necessary for the different branches of engineering field practice, including

chains, tapes, compasses, plane tables, stadias, transits, levels, barometers, base rods and comparing apparatus, sextants, and solar transits. These instruments are in constant use by the students whenever the weather will permit. *Baker's Engineer's Surveying Instruments. Winter and spring terms, with course 2 requires 10 hours a week.* Professor BAKER.

Required: Math., 4; General Engineering Drawing, 1, 2, 3.

4. Railroad Engineering.—In the field practice, the class makes preliminary and location surveys of a line of railroad of sufficient length to secure familiarity with the methods of actual practice. Each student makes a complete set of notes, maps, profiles, calculations, and estimates. In addition to the mathematical theory of curves, turnouts, crossings, and the calculations of earth work, instruction is given by means of text books and lectures on the principles of economic location, particularly the effect of distance, grade, and curve upon operation and maintenance, and of methods of construction, equipment, and maintenance of way. *Godwin's Railroad Engineers' Field-Book; Wellington's Economic Theory of Railroad Location. Fall term, 10 hours a week; winter term, 4 weeks, 5 hours a week.* Professor TALBOT.

   Required: Math., 4; General Engineering Drawing, 1, 2; Civil Engineering, 1, 2, 3.

5. Masonry Construction.—Requirements and methods of testing stone, brick, cement, and lime; composition, preparation, and strength of mortar and concrete; classification, construction, strength, cost of stone and brick masonry; foundations under water; theory of stability; cost, etc., of dams, retaining walls, bridge piers, bridge abutments, culverts, and arches. The students have experiments in the testing laboratory, in testing cement, mortar, stone, and brick. *Baker's Masonry Construction. Fall term, 7 hours a week.* Professor BAKER.

   Required: Math., 2, 4, 6, 7; Mechanics, 1, 2; General Engineering Drawing, 1, 2.

6. Geodesy.—Geodesy is taught by lectures and assigned reading. Studies are made of the instruments and methods employed in spirit, barometrical, and trigonometrical leveling; the apparatus and methods used in measuring base lines; the location and construction of stations; the method of measuring the angles

and reducing the triangulation; the principles of projecting maps; the methods employed in running parallels and meridians. The apparatus consists of a 12-inch alt-azimuth instrument reading to single seconds, a precise level, aneroid and mercurial barometers, three wooden base rods, a comparator, a steel tape with level, thermometer, and spring balance. Problems are solved in barometrical, trigonometrical, and precise leveling, and in reading horizontal angles. *Half of fall term, 5 hours a week.* Professor BAKER.

Required: Math., 4; General Engineering Drawing, 1, 2, 3; Civil Engineering, 1, 2; Descriptive Astronomy, 2.

7. Practical Astronomy.—Is given by lectures, recitations, and practice. The object is to familiarize the students with those principles of practical astronomy employed in extended surveying operations, and also to train the student in methods of exact observations. The apparatus consists of an observatory with three isolated stone piers; a 12-inch alt-azimuth instrument reading by micrometers to single seconds, both of altitude and azimuth; an astronomical transit; three chronometers; two sextants; two solar transits; and a set of meteorological instruments. The problems include the adjustments of all the instruments, and the determination of time, latitude, and azimuth by the several methods. *Loomis's Practical Astronomy. Half of fall term, 10 hours a week.* Professor BAKER.

Required: Math., 4; General Engineering Drawing, 1, 2, 3; Civil Engineering, 1, 2; Descriptive Astronomy, 2.

8. Bridges.—The instruction in bridges occupies two terms. The first—bridge analysis—is devoted to the calculations of the strains in the various forms of bridge trusses, by algebraic and graphical methods, consideration being given to weights of bridge and train, and force of wind. The second—bridge design—is devoted to designing bridges, proportioning sections, and working out of details. Each student designs and makes a full set of drawings of a bridge. The apparatus consists of a series of full size joints and connections of a modern iron railroad bridge, numerous models of bridges, a large collection of drawings, photographs and lithographs of bridges. *DuBois's Strains in Framed Structures. Winter and spring terms, 5 hours a week in the former and 10 in the latter.* Professor BAKER.

Required: Mechanics, 1, 2.

9. Tunneling.—This course, treating of methods of tunneling and mine attack, is given to students of civil engineering. The lectures treat first of the nature and use of explosives, compressed air and power drills. The methods of tunneling are then explained and discussed with their accompanying methods of timbering and walling. Attention is given to the sinking of shafts for the working of tunnels, or for the purposes of driving. The details of the duties of a tunnel engineer are made as clear and concise as possible. Some time is given in the earlier part of the course to the practice in hydraulics, boring wells, dredging, and quarrying. *Spring term, 5 hours a week.* Professor BALDWIN.

Required: Math., 2, 4, 6; General Engineering Drawing, 1, 2; Shop Practice A; Mechanical Engineering, 4; Chemistry, 1; Physics, 1.

10. Surveying.—For students in the courses of architecture, architectural engineering, and mechanical engineering. Areas with chain and compass; U. S. public land surveys, and principles of re-establishing corners; use of transit in finding distances, areas, and in laying out buildings; use of the level in finding profiles and contours. *Baker's Engineers' Surveying Instruments. Spring term, 10 hours a week.* Professor BAKER.

Required: Math., 4; General Engineering Drawing, 1, 3; Physics, 1.

MUNICIPAL ENGINEERING.

1. Road Engineering.—Instruction is given by means of text books and lectures. In country highways the value and importance of road improvement and the best means of securing it are considered, together with the principles and details of construction of earth, gravel, and macadam roads. In city streets, the methods of construction, cost, durability, and desirability of the various kinds of pavement, and the question of grades, cross sections, methods of assessment of cost, and methods of maintenance and cleaning are treated. *Gilmore's Roads, Streets, and Pavements. Winter term, 7 weeks, 5 hours a week.* Professor TALBOT.

Required: Math., 4; General Engineering Drawing, 1, 2; Civil Engineering, 1, 2, 3, 4.

2. Water Supply Engineering.—This subject is intended to cover the principal features of the construction of water-works, including the tests and standards of purity of potable water: the choice of source of supply; the designing of the distribution system, pumps and pumping machinery, reservoirs, standpipes, and the filtration of water. *Lectures; Fanning's Water Supply Engineering. Fall term, 5 hours a week.* Professor Talbot.

   Required: Mechanics, 1, 3: Chemistry, 1; Mechanical Engineering, 4; (Steam Engineering).

3. Sewerage.—The design and methods of construction of sewerage systems for cities, including the following: sanitary necessity of sewerage: water carriage systems, both separate and combined; surveys and general plans; hydraulics of sewers; relation of rainfall to storm water flow, and determination of size and capacity of sewers: house sewage and its removal: form, size, design, and construction of sewers and sewer appurtenances; modern methods of sewage disposal by filtration, chemical precipitation, irrigation, etc., with resultant changes in the sewage: estimates and specifications. *Lectures; Staley and Pierson's Separate System of Sewerage. Winter term, 5 hours a week.*

   Required: Mechanics, 1, 3; Chemistry, 1.

4. Botany.—This is a study of the lowest orders of plants, including such species as are most commonly met with in microscopical examinations of water, and found associated with putrescent substances. Lectures or recitations and microscopical laboratory work. This is practically the same as the first part of the second term of botany 1, in College of Science. *One half of winter term, 10 hours a week.* Professor Burrill.

5. Bacteriology.—For students in course in municipal engineering. This course includes the identification and classification of bacteria, and of allied organisms, their relations to health and to disease, the methods of separation and cultivation, and the methods of air and water analysis. The laboratory is furnished with sterilizers, culture ovens, microscopes, etc.; and students have abundant opportunity to do practical work. This is at first the same as bacteriology 1, in the College of Science, but in the latter part of the term special investigations are undertaken

by the engineering students. *Fall term, 10 hours a week.* Professor BURRILL.

Required: Botany, 1, first half of winter term.

MINING ENGINEERING.

1. Mine Attack.—This includes the means and methods of attack, and the transportation of products to the surface, as follows: (1) tools, implements, machinery, explosives, stripping, boring, sinking, drifting, etc.; (2) timbering; (3) haulage; (4) hoisting; (5) ventilation; (6) drainage. There are coal mining districts within easy reach, and the mine managers offer to students every facility for visiting and inspecting the mines.

   Diagrams, charts, models, and full sized tools and machines in possession of the University, are used in illustrating the lectures. *Fall term, 5 hours a week.* Professor BALDWIN.

   Required: Math., 4; Chemistry, 1, 6; Physics, 1.

2. Mine Surveying.—Instruction is given by lectures and recitations, and includes the use of the solar compass, solar attachments, practice of the U. S. deputy surveyors, traverse survey with inclined measurements, connection of surveys above and below ground, and the determination of the position of bore holes, drifts, and shafts from data given or acquired by the students. The field work is carried along with the lectures. The University has three transit instruments especially adapted for underground work. The field work is under the personal supervision of the instructor, and all checks are made by the students, as in regular surveys. Complete plats, maps, drawings, and calculations are required for all field work.

   Surveying in the mines for two weeks at the end of the term familiarizes the students with the peculiar features and difficulties of underground practice. *Spring term, 10 hours a week.* Professor BALDWIN.

   Required: Math., 4; General Engineering Drawing, 1, 3; Civil Engineering, 1, 2, 3.

3. Ore Dressing.—The fall term is devoted to ore dressing, and the course comprises lectures upon properties of ores in respect to subsequent treatment: theory of jigging and treatment of slimes; hand dressing: machine crushing, crushers, rolls, stamp mills, and pulverizers, etc.; sizing machinery, classifiers, and

separators, etc.; sorting machinery; comparative economy and efficiency of different methods of treatment; typical dressing works. During the entire course the students work in the laboratory, making mill and experimental tests upon the large scale. The laboratory is equipped for this purpose with a Dodge crusher, a pair of Cornish rolls, elevators with deflecting spouts, automatic sampler, sizing screens, jigs, hydraulic separator, and rotating table. There is also a chlorine generator with tanks and vats. The machines are all of regular working size, driven with gearing by a steam engine, and worked in accordance with the practice of milling and testing laboratories. A complete series of assays is made of the products from each machine, and schemes of treatment and the speeding of the machine are worked out from the data.

4. Mine Engineering.—Two terms are devoted mainly to the technical and professional branches of mining. The exploration, development, and exploitation of mines are considered at length. The complications which arise are specially brought out from the study of typical mines. Instruction in mine management and mine accounts is given. Calculations and designs from actual data are required from the students. The operation of machines and apparatus, ventilation, etc., are explained in accordance with the principles underlying them, as well as from the standpoint of practice. *Fall term, 10 hours a week; winter and spring terms, 5 hours a week.* Professor BALDWIN.

   Required: Chemistry, 1, 6; Physics, 1; Mine Engineering, 1, 2, 3.

ARCHITECTURE.

1. Shop Practice B.—To give a practical knowledge of various kinds of work, three terms are devoted to a course of instruction, which all architectural students are required to pursue, unless they have previously had equivalent practice and obtained credit therefor.

   First Term.—Carpentry and Joinery. Planing flat, square, and octagonal prisms and cylinders; framing with single, double, and oblique tenons; splices, straight and scarfed; mitre, lap, and gained joints; through and lap dovetails; mouldings, mitres, mitre-box, and panels.

Second Term.—Turning and cabinet making. Glue joints; mouldings; inlaying: ornamental veneering: turning cylinders, balusters, ornamental forms, capitals, rosettes, vases, etc.

Third Term.—Construction of portions of buildings or of complete architectural structures at a reduced scale; roof trusses, stairs, frames of wooden buildings, etc., made from drawings.

2. General Architectural Construction.—(*a*) Wood Construction. Formulæ and data for computing the dimensions and strengths of columns, rods, beams, girders, etc., of wood or metal are first given and then applied in the solution of numerous examples. The kinds of wood and their uses in construction and decoration, their seasoning, shrinkage, defects, and modes of protection from decay, are next studied. The construction and design of wooden floors, walls, ceilings, and roofs are then tretaed, and afterwards, joinery, comprising doors, windows, bays, inside finish, cornices, wainscoting, etc. The construction and design of stairs of the various types terminate the work of the term. About twenty problems are worked out on as many plates by the student.

(*b*) Stone, Brick, and Metal Construction. Foundations of stone, brick, concrete, and on piles, are first studied. Then the materials employed in stone masonry, their uses, defects, qualities, and mode of preparation. Kinds of masonry and external finish. Tools and methods of stone cutting. The preparation of working drawings is illustrated by practical applications in the study of the arch, the vault, and the dome. Brick masonry is next examined, with its materials, and bonds, and several examples are drawn. The manufacture and refining of cast-iron, wrought-iron, and steel are then studied, together with the processes of pattern making, molding, casting, refining, rolling, etc., as well as the stock or standard dimensions or sections to be obtained in the market. The special properties and value of each metal in a structure, the designing of a line of columns in a tall mercantile building, and of beams and girders, together with the study of joints and connections completes the work of the term. About twelve problems are drawn on the same number of plates. *Ricker's Wood, Stone, Brick, and Metal Construction; Pierce's Mathematical Tables. Fall and winter terms, 10 hours a week; 3 recitations and 7 hours drawing.* Mr. White.

Required: Shop Practice B; General Engineering Drawing, 1, 2, 3.

3. Sanitary Construction.—Daily recitations or special lectures, with designs for special problems. The study of plumbing, trap ventilation, removal of wastes, construction of water closets, drains and systems of water supply; sewage disposal. Hot water supply and fixtures in dwellings. *Gerhard's Drain ge and Sewerage of Dwellings; Lectures on Sewage Disposal; Dye's Hot Water Supply. Spring term, 5 hours a week.* Mr. WHITE.

   Required: Math., 4; Shop Practice B; Physics, 1.

4. Architectural Drawing.—(*a*) The subjects of instruction are the different methods of finishing architectural drawings in line and washes, the use of the orders, and the study of shades and shadows, these being combined to produce the greatest benefit, so far as possible. Penciling, inking, washing, and tinting drawings are practiced, as well as obtaining cast shades and shadows. The single plane method is preferred for this purpose, and is found applicable to most cases. The orders are drawn in plan and elevation, as well as superposed, and the shades and shadows are found on a capital and base, drawn at large scale. Drawings are finished in ink, ink wash, sepia, and various tints. Lectures and special instruction in shades and hadows.

   (*b*) The second term is devoted to instruction in the office style of preparing working drawings for a given building. Rough figured sketches are furnished to the student, from which each student makes a set of general and detail drawings in pencil on opaque paper. These are then traced in ink on transparent paper or linen and colored to indicate materials. Especial care is taken to secure neat lettering and accurately figured dimensions. Personal instruction to each member of the class. *Vignola's Five Orders; Spiers's Agricultural Drawing. Fall and winter terms. 10 hours a week.* Mr. WHITE.

   Required: General Engineering Drawing, 1, 2, 3; Architecture, 2.

5. History of Architecture.—Two terms' work, usually divided at the beginning of the Romanesque style. Commencing with the Egyptian and ending with the renaissance, a careful study is made of each of the more important styles, successfully examining the historical conditions, the local and inherited influences, the structural materials and system, the special ornaments, and the purposes and designs of the buildings, with an examination of a few of the most important typical

examples of the style. Especial attention is given to any ideas that might be useful or suggestive in American work, and to tracing the gradual evolution of architectural forms. This study therefore becomes a very interesting branch of the history of human civilization. References are made to numerous works, especially to Fergusson, Lubke, Durm, Reber, Gailhabaud, etc. *Ricker's Notes on History of Architecture; Goodyear's History of Art. Winter and spring terms, 5 hours a week.* Professor RICKER.

Required: Architecture, 2, 3, 4 (*a*).

6. Roofs.—This term is devoted to the elements of graphic statics, and to the applications of the science in the designing of trussed roofs. The composition and resolution of forces, equilibrium, reactions, moments, bending moments and shears on beams, center of gravity and moment of inertia of any form of cross sections, are first examined. The construction of wooden and of metallic roofs are next studied, then the mode of computing permanent and temporary loads on roof trusses, of obtaining end reactions, of drawing strain diagrams, determining sectional dimensions of members, and ending with the designing of joint connections. Numerous problems are solved, five different types of trusses are usually worked out, complete designs and details being made for one of wood and another of iron or steel. *Ricker's Trussed Roofs. Spring term, 3 hours recitation and 7 hours drawing a week.* Mr. WHITE.

   Required: Math., 2, 4, 6, 7; Theoretical and Applied Mechanics, 1, 2; Architecture, 2, 3, 5 (except for students in civil engineering course).

7. Architectural Perspective.—The theory of perspective is taught, with all labor saving methods of abbreviating the labor, and designing in perspective itself is made a special aim, this power being very useful to a draughtsman in preparing sketches for clients. Methods of diagonals, by triangles, and by coördinates are all used. Problems in angular, parallel, vertical, and curvilinear perspective, as well as in perspective shades and shadows, are solved, requiring original work as far as possible, so as thoroughly to prepare the student for any kind of work in perspective, instead of restricting him to the study and use of a single system. Six problems are worked

out on as many plates. *Ware's Modern Perspective. Fall term, 10 hours a week.* Mr. WHITE.

Required: Architecture, 2, 3, 5.

8. Superintendence, Estimates, and Specifications.—This study comprises several specialties in office work, not otherwise provided for, so far as they can be taught in a professional school. One-third the time is devoted to superintendence, one-half to estimates, and the remainder to specifications, contracts, etc.

Text book in superintendence is Clark's Building Superintendence, which is carefully read with daily recitations.

In estimates, the purpose of the instruction is to impart a knowledge of the usual methods of measurement of materials and work, the arrangement of computations in proper and convenient order, and an acquaintance with approximate prices of materials and labor, which vary in different localities. The methods of squaring, cubing, of units, and of quantities, are each employed and illustrated by numerous examples.

In Specifications, practice is obtained by writing out a complete set for a house, drawings for which have been previously made by the student.

Groves' Specification Blanks are employed.

The standard Contract of the American Institute of Architects is used, being first carefully studied, then filled out for the same house. Bids, certificates, etc., are also prepared. Reference to *Ricker's Notes on Estimates; Wohlgemuth's Ready Reckoner: Lloyd's Law of Building. Fall term, 5 hours a week.* Professor RICKER.

Required: Architecture, 2, 3, 4, 5.

9. Advanced Graphics.—This continues the study of graphic statics, commenced in roofs, with applications to metallic roofs of wide spans, roof trusses, of curved or arched form, and those supported by abutments and also jointed. Continuous girders are also examined, with the effect of moving loads on girders, the instruction ending with the graphical analysis of the arch, vault, and dome, and of the Gothic system of vault and buttress. Instruction is imparted by special lectures, and applications are made to a series of problems in designs for specified cases. *Planat's Mecanique Applique; Landsberg's Statik: Dubois and Clarke's Graphical Statics; Levy's Graphique Statique (Last Ed.). Fall term, 10 hours a week.* Professor RICKER.

Required: Math., 2, 4, 6, 7; Theoretical and Applied Mechanics, 1, 2; Architecture, 2, 5, 8.

10. Heating and Ventilation.—A full knowledge of the scientific theory and of the practice of warming and ventilating buildings is the purpose of this study. Commencing with the fuels and the production of heat, the student passes to the flow of gases through ajutages and pipes, applying these data to the calculation of the dimensions of air ducts and chimneys. The different systems of heating by furnaces, hot water, steam, etc., are next examined, with the details of each. The sources of impurity in the air and the requirements of good ventilation are then considered, with the different methods of ventilation by aspiration, by fans, etc., ending with the study of fans of different types. Numerous problems are given. *Ricker's abridged translation of Planat's Chauffage et Ventilation. Winter term, 5 hours a week.* Professor Ricker.

Required: Math, 4; Architecture, 2, 3, 4, 5; Physics, 1; Chemistry, 1.

11. Architectural Designing.—(*a*) Since students often find considerable difficulty when commencing to express their ideas in designs, several simple problems are first given, such as a tower, a store with flats over it, a small library, etc., usually five being studied during the term. Each student makes sketches at small scale, which are criticised and modified until approved, then worked out in plans, elevations, and details, one elevation being washed to show color or shade effects. The object is to obtain as much practice in original design as possible, and in the making of rapid and effective sketches, suitable for submission to a client or employer.

(*b*) Further practice in design and the study of the requirements of dwellings of moderate size are the objects of the study. Several typical plans are selected as bases, and numerous changes suggested, which usually produce radical changes in the design. The student is also encouraged to make working drawings for actual clients, criticisms and suggestions being freely made to him. The work is limited to residences, since this class of buildings is likely to afford the graduate his first opportunity for independent original work, and practice in satisfying their requirements is considered to be more valuable than the study of theoretical or impossible problems. The

designing of a convenient, attractive dwelling, to cost a limited amount, is really a quite difficult problem, requiring more time and thought than any other building of equal cost. *Gibson's Convenient Houses. Winter and spring term, 10 hours a week.* Professor RICKER.

Required: Architecture, 2, 3, 5.

12. Esthetics of Architecture.—Subject, the laws of correct design, so far as these may be formulated in words, illustrated by the study of numerous examples. Commences with the study of the nature and mode of working of the different materials used in structural and ornamental purposes, deducing the proper ornamental treatment for each, then taking up the proper decoration of walls, ceilings, and roofs. The general principles of ornamentation are next stated, as applied to flat surfaces and to solids of various shapes. A full study of the various materials used in furniture, art works, etc., is then made, with suggestions of their proper use in the art industries. About twenty problems in original design are worked out on as many plates. *Ricker's (abridged) translation of Redtenbacher's Architiktonik; Mayeux, Decorative Composition. Spring term, 10 hours a week.* Professor RICKER.

    Required: Architecture, 2. 3, 5, 6, 12(*a*).

13. Architect's Course in Artistic Drawing and Modeling. For second year students.

    First term. Principles of free hand drawing and light and shade learned from drawing geometric solids (*a*) in outline; (*b*) in washes of water color; (*c*) in values of charcoal.

    Second term. Principles applied by drawing (*a*) groups of common objects. as books, vases, chairs, tables, etc.; (*b*) casts of ornament; (*c*) interiors, as the corner of the room; (*d*) plants and flowers from nature. Special attention is given the work from casts and interiors.

    Third term. Rendering perspectives in washes of water color (sepia). Sketching from nature.

    Lectures are given throughout the year on design and the historic styles of ornament. Students are required to prepare (*a*) a monograph of the ancient, mediaeval, or modern styles; (*b*) original exercises showing principles and methods; (*c*) original exercises employing color.

Lectures on perspective are given the second term, and the problems then worked out are illustrated by sketches from nature and made during the third term.

Instruction in pen etching is given throughout the year, but most of the work must be done out of hours. *Gregg's Architectural Rendering in Pen and Ink. Fall, winter, and Spring terms, 10 hours a week.* Professor FREDERICK.

Required: Elements of Draughting.

14. Architect's Course in Artistic Drawing and Modeling. For fourth year students.

First term. Modeling in clay (*a*) details of human face; (*b*) copy of cast of ornament; (*c*) ornament from photograph. Casts are made of (*a*) at least one modeled piece; (*b*) arm, hand, or foot from nature; (*e*) foliage, fruit, or vegetable from nature. One original design required.

Second term. Study of color as a means of exterior and interior decoration, at least one color scheme to be worked out, full size, in tempera colors. In place of this a second term of modeling can be taken.

Third term. Work in water colors, groups, flowers, and perspectives, or sketching from the antique and life. Sketching from nature in color. *Fall, winter, and spring terms, 10 hours a week.* Professor FREDERICK.

Required: Architecture, 14.

ADDITIONAL SUBJECTS.

The following subjects, offered to students in the College of Engineering, are described elsewhere as noted:

In College of Science—

Chemistry, 1, 2, 3, and 6; Mineralogy, 1; Geology, 1, 3; Metallurgy, 1.

In College of Literature—

French, 4; German 4; English, 1, 2; Themes and Elocution, 1; Constitutional History, 3; Political Economy, 1.

In School of Military Science—

Drill Regulations for Infantry, 1; Drill Practice, 2.

School of Art and Design—

Free Hand Drawing, 5.

MECHANICAL ENGINEERING.

OBJECT.

This course is designed to prepare students for the profession of mechanical engineering. It aims to fit them to invent, design, construct, and manage machinery for any branch of manufactures. There is a great demand for men who, to a thorough knowledge of the principles of machinery and of the various motors, add the practical skill necessary to design and construct the machines by which these motors are made to work.

INSTRUCTION.

The instruction, while severely scientific, is thoroughly practical. It aims at a clear understanding and mastery of all mechanical principles and devices. Practice in the workshop is required as one of the studies of the course.

In principles instruction is imparted by lectures, illustrated plates, and text books. Examples are given, showing the application of the theories and principles taught. Experiments in the testing of machines and motors are undertaken by the student.

In practice elementary forms are produced and projects are executed, in which the student constructs machines, or parts thereof, of his own designing, and from his own working drawings.

In designing the student begins with elements and proceeds with progressive exercises till he is able to design and represent complete machines.

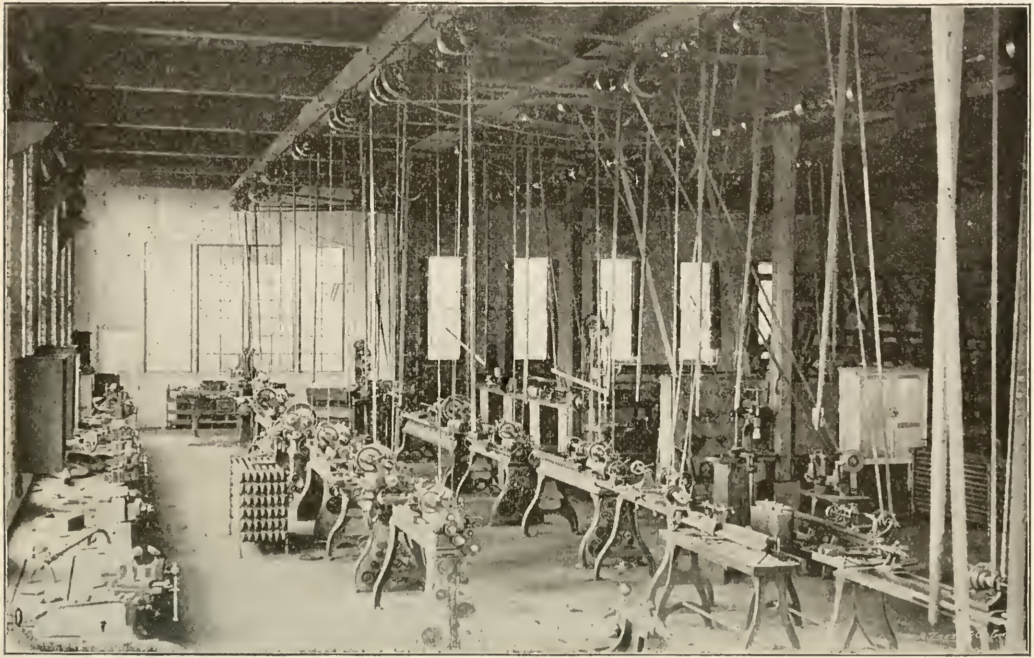
EQUIPMENT.

The mechanical laboratory consists of a large, well lighted machine shop, a pattern shop, a blacksmith shop, and a foundry.

The machine shop is supplied with twelve first-class engine lathes, ranging from twelve- to twenty-four-inch swing, ten hand lathes, two shapers, a planer, two milling machines, three drill presses, one punching machine, a Brown & Sharpe universal grinding machine, sixteen vises and the corresponding sets of bench tools. This shop is also provided with complete sets of standard guages, reamers, arbors, drillers, etc.

The pattern shop is provided with thirty-two benches, each supplied with a case of wood-working tools.

The blacksmith shop contains sixteen forges, fitted with power blast, sixteen anvils and sets of blacksmith tools.



MACHINE SHOP

The foundry is equipped with a cupola for melting iron, the necessary sand, ladles, flasks, etc., for making the castings which are afterward to be used in the machine shop.

The laboratory is also supplied with dynamometers, friction brakes, calorimeters, steam engine indicators, and other apparatus for carrying on mechanical laboratory work. A 50-horse power high speed engine, made by the students in the machine shop, furnishes power and is available for testing purposes. Three other steam engines, a gas engine, and several boilers of different makes furnish ample material for testing by the students in this department.

Course in Mechanical Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Mechanical Drawing and Construction; Physics; French, or German (optional); Military.
2. Advanced Analytical Geometry; Mechanical Drawing and Construction; Physics; French, or German (optional:) Military.
3. Integral Calculus; Mechanical Drawing and Construction; Physics; French, or German (optional); Military.

THIRD YEAR.

1. Analytical Mechanics; Mechanism; Chemistry; Themes and Elocution.
2. Resistance of Materials; Engineering Materials; Chemistry; Themes and Elocution.
3. Hydraulics; Mechanism of Machines; Electrical Measurements, or Surveying; Themes and Elocution.

FOURTH YEAR.

1. Heat Engines; Machine Design; Masonry Construction.
2. Hydraulic Engines and Wind Wheels; Mechanical Laboratory, or Dynamo Electrical Machines; Constitutional History; Thesis.
3. Estimates; Mechanical Laboratory; Political Economy, or Astronomy; Thesis.

ELECTRICAL ENGINEERING.

The electrical laboratory occupies a large room on the ground floor, fitted with masonry piers for the more sensitive instruments, and cases for apparatus. In this room the work relating to the measurement of current, resistance, electro-motor force, the standardizing of measurement apparatus, etc., is carried on.

In addition to this are a photometry room, intended especially for photometric work in connection with electric lighting; a battery room containing a large storage battery and a collection of all the leading primary cells which are used for current and testing purposes; a dynamo room supplied with power from a fifteen-horse power gas engine and a sixty-horse power, high speed steam engine, both of which are used exclusively for this department and experimental work. In this room are to be found the leading types of dynamos and motors with conveniences for illustrating and testing them. A complete Thomson-Houston alternating plant has lately been added to the equipment of this room.

Adjacent to the dynamo room is a workshop supplied with power from an electric motor. The shop is supplied with an engine lathe and a line of fine tools suited to the manufacture of special apparatus.

Equipment.—The electrical laboratory has been supplied with apparatus from the leading makers at home and abroad. There are several forms of the Wheatstone bridge, resistance boxes, including an Anthony 100,000 ohm box, and a Nalder Bros. subdivided megohm box, an assortment of switches, keys. condensers, and the leading forms of deadbeat and ballistic galvanometers, including a Thompson high resistance, and an Edelman deadbeat galvanometer; also several D'Arsonval galvanometers, and numerous others. Several reading telescopes are used in connection with the galvanometers. The laboratory is also supplied with certified standards of resistance, standard cells, Thompson's current balances, ammeters, voltmeters, and watt-meters. Current is brought to the room from the dynamo and battery rooms.

Course in Electrical Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.

3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus: Mechanical Drawing and Construction; Physics; French, or German (optional); Military.
2. Advanced Analytical Geometry; Mechanical Drawing and Construction; Physics; French, or German (optional); Military.
3. Integral Calculus; Mechanical Drawing and Construction; Physics: French, or German (optional); Military.

THIRD YEAR.

1. Analytical Mechanics; Mechanism: Chemistry; Themes and Elocution.
2. Resistance of Materials; Engineering Materials; Chemistry: Themes and Elocution; Military.
3. Hydraulics (one-half term); Chemistry (one-half term); Mechanism of Machines; Electrical Measurements; Themes and Elocution.

FOURTH YEAR.

1. Machine Design; Heat Engines; Primary and Secondary Batteries.
2. Hydraulic Engines and Wind Wheels; Dynamo-Electrical Machines; Electrical Laboratory; Thesis.
3. Installation of Light and Power Plants; Electrical Laboratory; Political Economy, or Astronomy; Thesis.

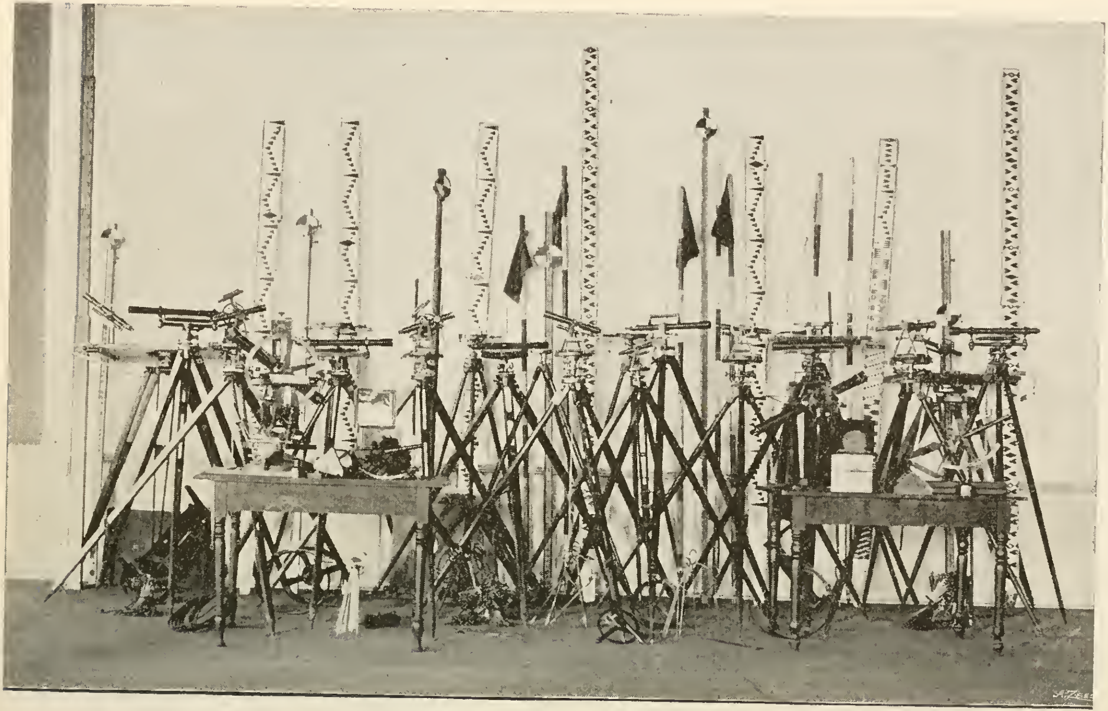
CIVIL ENGINEERING.

OBJECT.

The design is to furnish a course of theoretical instruction, accompanied and illustrated by a large amount of practice, which will enable the student to enter intelligently upon the various and important duties of the civil engineer.

INSTRUCTION.

While the instruction aims to be practical by giving the student information and practice directly applicable in his future professional work, the prime object is the development of the mental faculties. The power to acquire information and the ability to use it, is held to be of far greater value than any amount of so-called practical acquirements. The method of instruction consists in coupling the development of intellectual power with the acquisition of information directly useful to the civil engineer in his profession.



CIVIL ENGINEERING INSTRUMENTS

The instruction is given by lectures, text books, and reading, to which are added numerous problems and practical exercises, as will serve best to explain principles completely and fix them in the mind. Models and instruments are continually used, both in lectures and by the students.

COURSE OF STUDY.

The complete course occupies four years. The several subjects included therein are shown in the list below. Each study requires five recitations per week, and should receive daily from three to four hours of the student's time. Some of the class exercises occupy one hour daily, while others require two hours: as a rule the latter require less time for preparation. The order of studies, as given by the year and term in the tabular view of the course, should be closely followed to avoid interference in hours of recitation, and because the studies are there given in the order which best meets the preparation of the student.

Course in Civil Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytical Geometry; Advanced ~~Analytical~~ Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Land Surveying; Physics; French, or German (optional); Military.
2. Advanced Analytical Geometry; Topographical Drawing and Transit Surveying and Leveling; Physics; French, or German (optional); Military.
3. Integral Calculus; Topographical Surveying; Physics; French, or German (optional); Military.

THIRD YEAR.

1. Analytical Mechanics; Railroad Engineering; Chemistry; Themes and Elocution.
2. Resistance of Materials; Railroad and Road Engineering; Engineering Materials; Themes and Elocution.
3. Hydraulics; Astronomy; Roofs; Themes and Elocution.

FOURTH YEAR.

1. Masonry Construction; Geodesy and Practical Astronomy; Water Supply Engineering.
2. Bridge Analysis; Sewerage; Geology; Thesis.
3. Bridge Designing; Tunneling; Political Economy; Thesis.

MUNICIPAL AND SANITARY ENGINEERING.

OBJECT.

This course is a modification of the civil engineering course and is designed for students intending to make a specialty of city engineering work. It includes the study of chemistry and bacteriology necessary to a comprehension of the questions involved in water supply and sewage disposal.

Course in Municipal and Sanitary Engineering.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytical Geometry; Advanced Analytical Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Land Surveying; Physics; French or German (optional); Military.
2. Advanced Analytical Geometry; Topographical Drawing, and Transit Surveying and Leveling; Physics; French or German (optional); Military.
3. Integral Calculus; Topographical Surveying; Physics; French or German (optional); Military.

THIRD YEAR.

1. Railroad Engineering; Analytical Mechanics; Chemistry; Themes and Elocution.
2. Railroad and Road Engineering; Resistance of Materials; Botany, one-half term; Steam Engineering, one-half term; Themes and Elocution.
3. Roofs; Hydraulics; Electrical Measurements; Themes and Elocution.

FOURTH YEAR.

1. Water Supply Engineering; Masonry Construction; Bacteriology.
2. Sewerage; Bridge Construction; Chemistry.
3. Tunneling; Bridge Analysis; Chemistry.

MINING ENGINEERING.

OBJECT.

This course has been provided to meet the growing demand of a very important industry, the subjects of which are the discovery, opening, e onomical working and proper ventilation of mines; the prevention of accidents; transportation above and below ground; treatment of products; with many others which fall within the scope of the mining engineer. It is important that a broad basis be laid by way of general preparation for the more technical studies here included. Whatever of general culture the student may obtain before entering the University, will not come amiss, and, although the requirement is not made, it is advised that all who can do so should acquire a reading knowledge of French or German before beginning this course.

The course comprises the greater part of the pure and applied mathematics of the courses in mechanical and civil engineering. Much time is devoted to chemistry and geology, with the addition of metallurgy and other technical studies peculiar to mining engineering.

Students who are graduated from this course are not supposed to be familiar with all the details of mine management from actual experience; but they will have obtained such a knowledge of the principles underlying all successful practice, and such a familiarity with the science of mining in all its branches, that the art may be acquired with the minimum of practice.

INSTRUCTION.

Lectures are given when desirable, but these are to be regarded as supplementary to other modes of instruction which are made to conform as closely as possible to the routine of the engineer in practice. In every detail the student is made to feel that he is dealing with the actual problems which he will meet in his professional work.

Plans, estimates, drawings, reports, and calculations, based upon data obtained in the student's own experience, are constantly required, and no pains is spared to familiarize each member of the class with the duties and responsibilities of every grade, from miner to manager.

COURSE OF STUDIES.

In the first two years the work is similar to that required in the course in civil engineering, but more time is given to chemistry. In

the third year geology and mine engineering, with assaying and metallurgy, take the place of special technical studies in the other engineering courses. In the fourth year strictly technical studies are continued, with others taken with the mechanical engineers, and with some of a more general character.

Mining Engineering Course.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Chemistry; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Chemistry; French, German, or English; Military.
3. Analytical Geometry; Free Hand Drawing; Chemistry; French, German, or English; Military.

SECOND YEAR.

1. Differental Calculus; Land Surveying; Physics; French, German, or Free Hand Drawing (all optional); Military.
2. Advanced Analytical Geometry; Topographical Drawing and Transit Surveying and Leveling; Physics; French, German, or Free Hand Drawing (all optional); Military.
3. Integral Calculus; Topographical Surveying; Physics; French, German, or Free Hand Drawing (all optional); Military.

THIRD YEAR.

1. Analytical Mechanics; Mine Attack; Mineralogy; Themes and Elocution.
2. Resistance of Materials; Assaying; Geology; Themes and Elocution.
3. Hydraulics, Roofs, or Chemistry; Mine Surveying; Geology; Themes and Elocution.

FOURTH YEAR.

1. Mine Engineering; Ore Dressing; Heat Engines; Geology.
2. Mine Engineering; Hydraulic Engines and Wind Wheels; Chemistry.
3. Mine Engineering; Political Economy, Chemistry, or Roofs; Metallurgy.

ARCHITECTURE.

OBJECT.

The object of this course of study is to prepare graduates for the profession of architecture, as architects, draughtsmen, and superintendents of construction. A thorough knowledge of scien-

tific principles applied to construction, and of drawing in its various developments, a practical acquaintance with the methods and processes of the various building trades, as well as a considerable degree of skill in the use of tools, are all essential to the fulfillment of this purpose, and are therefore made prominent in the course of instruction.

METHODS OF INSTRUCTION.

The principal lines of technical study take up the theory and practice of construction, the history and esthetics of architecture, architectural drawing as now practiced in offices, as well as the various modes of finishing drawings, the use of the architectural orders, and the usual routine and methods of office practice, so far as this can be successfully taught in a professional school.

This instruction is imparted by the study of text books, with recitations and the solution of numerous special problems, also by lectures, as well as by the use of syllabuses instead of text books, where suitable works do not yet exist. Engravings, photographs, models and sketches, are employed as illustrations.

Drawing is practiced during the entire course, and whenever possible, the student is required or encouraged to produce original designs. Opportunity is also afforded for two years' instruction in free hand drawing, modeling, water colors, designing, and sketching from nature.

Shop practice commences with the production of true plane surfaces in wood, and extends through joinery, cabinet work, turning, and veneering, to the making of models of architectural constructions to scale from drawings.

APPARATUS.

A collection of casts donated by the Spanish government, and another of casts of various architectural details from Lehr, of Berlin, belong to the departments of architecture and of design; models of ceilings, roof trusses, stairs and Schroeder's models of joints in wood work and of construction in cut stone work, in the engineering museum.

The department of architecture also possesses a large and rapidly increasing collection of engravings and photographs illustrating the history of architecture and art, and their practical applications in all ages. The collection is mounted on about 8,000 cards, 11 x 14 inches, and is classified in two parts, one for the use of the class in

history of architecture, the other for use by the various classes in designing; both series are minutely subdivided to facilitate easy reference, and are always open for free use, thus forming a most valuable working library. The plates issued by the most important American architectural journals are to be found here. This collection is placed in one of the architectural rooms.

The casts, photographs, etc., of the art gallery. In the University Library are many of the best English, German, French, and American architectural works and periodicals.

A large and well equipped carpenter and cabinet shop containing cabinet benches and sets of fine tools for classes in shop practice; foot and power lathes; machine saws, planers, moulder, tenoner, shaper, jig saw, mortiser, boring machine, etc.

An architect's level, rod, and 100-foot steel tape.

A 5x7 folding kodak of latest pattern, fitted with roll holder, plate holders, and film carriers. An 8x10 bellows camera with a Steinheil aplanatic, wide angle lens, for copying architectural views and interiors.

Architectural Course.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytic Geometry; Advanced Descriptive Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Wood Construction; Physics; French, German, or Free Hand Drawing (all optional); Military.
2. Advanced Analytical Geometry; Stone, Brick, and Metal Construction; Physics; French, German, or Free Hand Drawing (all optional); Military.
3. Integral Calculus; Sanitary Construction; Physics; French, German, or Free Hand (all optional); Military.

THIRD YEAR.

1. Analytical Mechanics; Architectural Drawing; Chemistry; Themes and Elocution.
2. Resistance of Materials; History of Architecture; Architectural Drawing; Themes and Elocution.
3. Roofs; History of Architecture; Surveying; Themes and Elocution.

FOURTH YEAR.

1. Superintendence, Estimates, and Specifications; Architectural Perspective: Free Hand Drawing, or Modeling.
2. Heating and Ventilation: Architectural Design; Free Hand Drawing, or Water Color; Thesis.
3. Esthetics of Architecture; Architectural Design; Free Hand Drawing, or Sketching; Thesis.

ARCHITECTURAL ENGINEERING.

The especial purpose of this course of study is to qualify graduates for the profession of architecture, and particularly as architects, structural draughtsmen, and computers, as well as superintendents of construction. It is intended for those students preferring the mathematical and structural side of architecture to its artistic side, and for those who wish to acquire a thorough knowledge of iron and steel construction as it is now executed in architectural structure.

The course of study differs from that in architecture in the following particulars: Hydraulics and surveying are both required, the last being a single term study arranged for architectural students. Masonry construction, bridge analysis, and bridge designing, as taught to civil engineers, are taken instead of the second year of work in advanced free hand drawing, such as modeling, industrial design, and color design. A term of work in advanced graphics is also offered in lieu of architectural perspective. The remainder of the course of study is identical with that in architecture. The methods of imparting instruction are also similar, and are fully described elsewhere.

Architectural Engineering Course.

FIRST YEAR.

1. Advanced Algebra; Elements of Draughting; Shop Practice; French, German, or English; Military.
2. Trigonometry; Descriptive Geometry and Lettering; Shop Practice; French, German, or English; Military.
3. Analytical Geometry; Advanced Descriptive Geometry; Shop Practice; French, German, or English; Military.

SECOND YEAR.

1. Differential Calculus; Wood Construction; Physics; French, German, or Free Hand (all optional); Military.
2. Advanced Analytical Geometry; Stone, Brick, and Metal Construction; Physics; French, German, or Free Hand (all optional); Military.

3. Integral Calculus; Sanitary Construction; Physics; French, German, or Free Hand (all optional); Military.

THIRD YEAR.

1. Analytical Mechanics; Architectural Drawing; Chemistry; Themes and Elocution.
2. Resistance of Materials; History of Architecture; Architectural Drawing; Themes and Elocution.
3. Roofs; History of Architecture; Hydraulics; Themes and Elocution.

FOURTH YEAR.

1. Masonry Construction; Superintendence, Estimates, and Specifications; Architectural Perspective or Advanced Graphics.
2. Bridge Analysis; Heating and Ventilation; Architectural Design; Thesis.
3. Bridge Design; Surveying; Architectural Design; Thesis.

COLLEGE OF SCIENCE.

SCHOOLS.

CHEMISTRY: NATURAL SCIENCE.

FACULTY.

THOMAS J. BURRILL, PH.D., ACTING REGENT, Botany.
STEPHEN A. FORBES, PH.D., *Dean*, Zoölogy and Entomology.
CHARLES W. ROLFE, M.S., Geology.
ARTHUR W. PALMER, SC.D., Chemistry.
SAMUEL W. PARR, M.S., Chemistry.
HOWARD S. BRODE, Assistant in Zoölogy.
HARRY S. GRINDLEY, B.S., First Assistant in Chemistry.
GEORGE P. CLINTON, B.S., Assistant in Botany.
ROBERT H. FORBES, Second Assistant in Chemistry.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION IN THIS COLLEGE.

EDWARD SNYDER, M.A., German.
JAMES D. CRAWFORD, M.A., History.
JAMES H. BROWNLEE, M.A., Rhetoric and Oratory.
NATHANIEL BUTLER, JR., M.A., English Literature.
FRANK F. FREDERICK, Industrial Art and Design.
ELBRIDGE R. HILLS, First Lieut., U.S.A., Military Science.
M. R. PARADIS, M.A., French.
HERBERT J. BARTON, M.A., Latin.
SAMUEL W. STRATTON, B.S., Electrical Engineering and Physics.
GEORGE W. MYERS, M.L., Mathematics.
EDITH ADELAIDE SHATTUCK, Assistant in Industrial Art and Design.

COLLEGE OF SCIENCE.

The College of Science affords an opportunity for the thorough study of the natural and physical sciences, either as specialties or

as the substance of a liberal education. It is possible for the student to take a year each (five exercises a week) in chemistry, physics, zoölogy, botany, and geology, with a considerable amount of language, literature, and general studies: or to concentrate his science work on one of several subjects; taking, for example, four years in chemistry or three years in either botany or zoölogy.

It is the leading object of the chemical courses to give a technical education, as a preparation for chemical pursuits. It is the main purpose of the courses in natural science, on the other hand, to give a liberal education, based essentially upon a wide acquaintance with a considerable group of related sciences, or upon a more thorough knowledge of a smaller number. Access to the elective literary and historical subjects open to the student in these courses is conditioned only by a minimum requirement with respect to subjects more important to the immediate ends of the College of Science.

DESCRIPTION OF COURSES OF INSTRUCTION.

CHEMISTRY.

The chemistry of the College of Science is taught in ten courses of instruction, the first five of which form the regular four years' course of study in the school of chemistry. Course 6 is arranged for students of other schools, who have taken course 1: and course 7 is offered to pharmaceutical students, in place of course 3 for regular students of chemistry.

1. General and Experimental Chemistry.—Required of all students in this department. This course is intended to serve as an introduction to the subject of chemistry, and is directed chiefly to the fundamental and general principles of the science. The work of the term consists of illustrated lectures, recitations upon the subject matter of the lectures and upon text book lessons, and of practice in the laboratory. The laboratory work, comprising a series of experiments illustrative of chemical principles and their applications, and involving a consideration of the properties of some of the more important elements and their compounds, serves in part as a preparation for the work of the class room. *Remsen's Introduction to Chemistry. Fall term, 10 hours a week.* Professor PALMER.

2. Qualitative Analysis.—This course includes a systematic study of the metallic elements, their salts and compounds, and their

chemical formulæ and reactions, together with the principles which underlie qualitative analysis. In the laboratory these subjects are experimentally studied as preliminary to the work of qualitative analysis, which occupies the latter part of the winter and the first of the spring term. Following this, further application, and to a large extent an original use, of the knowledge gained is made in the preparation and purification of typical salts and compounds from the spent material which accumulates in other lines of work throughout the laboratory. *Thorpe's Inorganic Chemistry, Metals; Volhard and Zimmerman's Experimental Chemistry. Winter and spring terms, 15 hours a week.* Professor PARR.

Required: Chemistry, 1.

3. Quantitative Analysis and Assaying.—The work in this course extends through the sophomore year and the fall term of the junior year. It begins with the analysis of salts of definite and known composition, the purpose being to gain facility and accuracy of manipulation together with a general knowledge of the principles involved in the best practice. The class room work is chiefly lectures and recitations upon assigned topics in Fresenius's Quantitative Analysis. In the winter term practice is given in the use of methods for special lines of work, including volumetric assays and analysis of ores and furnace products. This is followed by the electrolytic determination of copper, etc., and by the usual fire assays of lead, silver, and gold. The class room instruction in this term is mainly by lectures and special notes, the student being required to read assigned parts of the works of Kerl, Mitchell, and others.

During the spring term lectures upon the chemistry of agriculture are given accompanied by laboratory work in the quantitative analysis of some of the materials employed in agriculture and agricultural products. The laboratory practice includes the analyses of complex silicates, as feldspar, mica, or glass, and of commercial fertilizers, milk and grain.

During the fall term of the junior year advanced quantitative work is continued, to include the analysis of potable and mineral waters, with special reference to their sanitary examination; of illuminating, furnace, and natural gases, etc. Use is made of both the eudiometric and absorption methods.

The class room work in this term is chiefly devoted to special applications of chemistry to the arts, to chemical technology,

etc. The instruction is by lectures and recitations upon assigned topics in standard works of reference. *Four terms, 10 hours a week.* Professors PALMER and PARR.

Required: Chemistry, 1, 2.

4. Organic Chemistry.—This course consists in a consideration of the principles and the processes of organic chemistry. The instruction comprises recitations, lectures, and laboratory practice. Remsen's Organic Chemistry is employed as a text book, and is supplemented by lectures upon special topics and by references to the works of Richter, Roscoe and Schorlemmer, and Beilstein. In the laboratory the practice consists in the preparation of organic compounds, in accordance with the directions given in the text book, with selections from the manuals of Levy and Fischer Some time is also devoted to ultimate organic analysis. *Winter and spring terms, 10 hours a week.* Professor PALMER.

   Required: Chemistry, 1, 2.

5. Investigations and Thesis.—This course is intended as a final preparation for the practical work to which the student intends to devote himself after graduation. In the first term some time is given to the study of toxicology and urinalysis, after which the candidate for a degree is required to engage in some line of original research. The subject of the investigation must be determined by or before the Thanksgiving recess, after which time, and until the Christmas holidays, the work is of such a nature as to familiarize the student with the special methods and processes involved in the research contemplated. After the holidays the work of investigation is prosecuted and the required thesis prepared. In this research work the student is required to make full use of the various sets of chemical journals, English, French, and German, as an essential means of extending his acquaintance with chemical literature and a drill in consultation of works of reference.

   Throughout the year the class instruction is by lectures, recitations, and by discussions in toxicology, in theoretical and thermo-chemistry, and in the history of chemistry. Wormley's Micro-chemistry of Poisons, Taylor on Poisons, Meyer's Modern Theories of Chemistry, and Meyer's Geschichte der Chemie are some of the works used during the year. *Fall, winter, and spring terms, 10 hours a week.* Professors PALMER and PARR.

   Required: Ten terms of chemical work.

6. Qualitative Analysis.—This is a course of study of three terms, arranged for students in other than the regular chemical courses. The first term's work is identical with that of course 1. In the second term a short course in qualitative analysis is given, which involves a study of chemical compounds and of chemical reactions, and their application to some of the more common metallurgical and other technological processes. The analysis of numerous compounds is made, involving also tests of material and special experiments which may bear upon the student's subsequent work. The class room work is by lecture and recitation upon assigned text. The third term's work consists of advanced qualitative analysis, including the purification and preparation of inorganic salts and compounds, etc. Special lectures and experiments are arranged in this course with reference to the needs of other University departments. *Fall, winter, and spring terms, 10 hours a week.* Professor Parr.

7. Advanced Work for Agricultural Students.—This course comprises one term's work in quantitative analysis identical with the first term of course 3, one term in organic chemistry, the first term of course 4, and a third term of work in agricultural chemistry similar to the third term of course 3 but more distinctly technical in scope. Text books are Fresenius's Quantitative Analysis, Remsen's Organic Chemistry. The instruction in Chemistry of Agriculture is mainly given by lectures and assigned reading. *Fall, winter, and spring terms, 10 hours a week.* Professors Palmer and Parr.

   Required: Chemistry, 1, and either 2 or 6.

8. Pharmaceutical Chemistry.—For students desiring to make a specialty of pharmaceutical chemistry. The first term is identical with the corresponding term of course 3. In the second and third terms the work consists in the valuation, quantitative analysis, and assay of various pharmaceutical materials and preparations; this work being followed by the preparation of pills, suppositories, syrups, emulsions, extracts, tinctures, and other galenical preparations, during the fourth term. *Parish's Treatise on Pharmacy; Fresenius's Quantitative Analysis; Prescott's Organic Analysis; U. S. Dispensatory and Pharmacopœia. Fall, winter, spring, and fall terms, 10 hours a week.* Professors Palmer and Parr.

   Required: Chemistry, 1 and 2.

9. Assaying.—For students in mining engineering. The course in assaying consists of instruction by lectures and from text books upon the ores, fuels, fluxes, furnaces, reagents, and chargers used in the fire assay of gold, silver, and lead ores. The laboratory practice includes daily use of the crucible and muffle furnaces and the manipulations connected with fire assaying. The rapid wet assay of copper and zinc ores is given in close connection with the course in fire assaying. Same as assaying in Chemistry 3. *Winter term, 10 hours a week.*

   Required: Chemistry, 1, 6; Mining Engineering, 1.

10. Metallurgy.—Especial attention is given to the effect of impurities in ores upon metallurgical processes and finished products. Fuels, refractory materials, and fluxes are described and their value and application explained. The known chemical reactions are expressed in equations: ore mixtures are calculated from analyses and experiments; and the size, construction, and working of furnaces are treated in accordance with modern practice. A series of models of furnaces and specimens of furnace material and products are used in illustration. The University is sufficiently near large and well conducted works smelting and refining iron, zinc. copper, silver, and lead for excursions to be made to them during the course. Instruction is given from text books when possible, but great freedom in choosing material from later publications and from the present practice of actual plants is used in the supplementary lectures. *Greenwood's Steel and Iron; Peter's Modern American Methods of Copper Smelting. Spring term, 5 hours a week.* Professor PARR.

    Required: Chemistry, 1, 6; Physics, 1.

MINERALOGY.

1. Mineralogy.—The first three weeks are devoted to crystallography, with recitations and laboratory practice upon models of crystal forms. In the determination of minerals students work upon sets of unlabeled hand specimens. Familiarity with species and skill in applying the best and quickest methods of determination are attained by constant practice on a large number of specimens: and the lectures and other instruction acquaint students with the chemical composition and the schemes of classification. Especial attention is given to ores and rock-forming minerals. The lectures are extended to cover the whole

series of minerals, but the time for laboratory practice is not sufficient to work on all. The succeeding term an opportunity is given to those who wish it for a continuation of laboratory practice, but credit will not be allowed unless especially granted. *Dana's Text Book of Mineralogy. Fall term, 10 hours a week.* Professor BALDWIN.

Required: Mathematics, 4; Chemistry, 1, 6.

GEOLOGY.

In the department of geology four courses are offered. For those students who wish more than a general acquaintance with the subject a major course of one year is provided, covering thirty-six weeks of class room and laboratory instruction; and a supplementary course of twenty-two weeks is offered to those who select a geological subject as a thesis. Engineers who wish an acquaintance with those portions only of the science which bear most directly on their future work are offered a minor course of eleven weeks. A minor course of eleven weeks is offered to those desiring merely an outline of the most prominent facts and theories of geology, with some ideas of the methods by which the geologist arrives at his conclusions.

COURSE 1.

1. Geology, Major Course.—(*a*) Dynamic Geology. The instruction given under this head is intended to familiarize the student with the forces now at work upon and within the earth's crust, modeling its reliefs, producing changes in the structure and composition of its rock masses, and making deposits of minerals and ores. A series of localities is studied in which great surface changes have recently taken place, with a view to ascertaining the character of the forces producing such changes, and the physical evidence of the action of like forces in the past. The subject is taught by lectures, and is abundantly illustrated by maps, models, charts, and views.

   (*b*) Petrographic Geology. The instruction under this topic is given by lectures and laboratory work. The subjects included are the classification of rocks, the methods used in their determination, the conditions governing the formation of each species, the decompositions to which they are liable, and the products of these decompositions. Each student is supplied with a set of

blow-pipe tubes and reagents, and a series of hand specimens covering all the common species of rocks.

(*c*) Historical Geology. The work on this subject is substantially an introduction to the history of geology as a science, and the developmental history of the leading geological doctrines. An attempt is also made to trace the history of each geological period, so far as may be done with the data in hand.

(*d*) Paleontology. The scheme of instruction in this subject places before the student the classification adopted for those organic forms occurring as fossils, together with the succession of the various groups that occur in the strata, with the cause, as far as known, for their appearance and disappearance. The student is required to familiarize himself with selected groups of paleozoic fossils, abundant illustrations of which are placed in his hands. The subject is presented in lectures and demonstrations, each group being considered in connection with its nearest living representative.

(*e*) Economic Geology. The final term of this course is devoted to a study of the uses man may make of geologic materials, the conditions under which these materials occur, and the qualities which render them valuable. The instruction is given by lectures, with references to the various state and government reports, transactions of societies, and monographs in which these subjects are treated, as well as by demonstrations with materials from the collections of the University.

In dynamic and historicai geology Dana's Manual is used as a reference book. Petrography is pursued by means of a blueprint adaptation of Rosenbusch for the crystalline rocks, and various authors for the fragmental. In paleontology Nicholson and Zittel are used for descriptions of the larger groups, Miller, for general distribution, and the various state surveys for species. *Winter and spring terms, 5 hours a week; fall term, 10 hours a week.* Professor ROLFE.

Required: Chemistry, 1; Physics, 1, or 2; Mineralogy, 1; Botany, 1, or 6; Zoölogy, 1, or 5.

2. Investigations and Thesis.—For students who select a geological thesis guidance and facilities will be afforded for individual investigations in the field and laboratory. *Winter and spring terms, 10 hours a week.* Professor ROLFE.

Required: Geology, 1.

3. Engineering Geology.—It is the object of this course to bring together those parts of geology which will be of the greatest practical benefit to an engineer. The course will deal mainly with subjects connected with the origin, classification, and transformations of rocks, with the principles which govern the deposition and structure of rock masses; with the conditions under which the useful rocks and minerals occur, and the conditions which make them more or less valuable. The instruction is given by lectures and by demonstrations in the laboratory. *Winter term, 10 hours a week.* Professor ROLFE.

4. General Geology, Minor Course.—This course includes a selection of such geological facts and theories as should be known to every intelligent person, with such discussion of them as the time will permit. The subjects treated will be fully illustrated, and opportunity will be afforded for some study of rocks and fossils. *Spring term, 10 hours a week.* Professor ROLFE.

METEOROLOGY.

1. Meteorology.—The study of those atmospheric movements which bring our changes of weather, with their relations to heat, cold, electrical conditions, wind, cloud, barometric pressure, etc., constitutes the work of the first half of the fall term. Abercrombie's Weather is used as an introductory text book: but most of the instruction is given by lectures, the study of charts, and attempts by the student to forecast weather changes. *Fall term, 2 hours a week.* Professor ROLFE.

   Required: Chemistry, 1; Physics, 1, or 2.

BOTANY.

Six courses of instruction are offered in this subject—five primarily intended to meet the wants of students making botanical work more or less a specialty, and the sixth occupying a single term, complete in itself, for students whose chief attention is given to other branches. Three to eight terms' work constitute a major course; that of the single term, course 6, a minor course. To a very large extent natural objects are studied rather than books: but constant endeavor is made to introduce students to pertinent existing literature. In the laboratory much use is made of the compound microscope and special attention is given to its manipulation for best results, and to the preparation of objects.

1. Histology, Morphology, and Physiology.—This major course extends through one year, beginning in the fall. At first systematic studies are made upon specially difficult natural orders of flowering plants; as Compositæ, Cyperaceæ, and Gramineæ; with attention given to nomenclature and to the principles of classification. After vegetation has been destroyed by frost the remainder of the fall term is devoted to the histology of plants. Students make and study microscopical sections and other preparations, make micro-chemical tests, draw figures, and write descriptive notes. Lectures or text book recitations occur about twice a week.

   The morphology and classification of special groups of plants, beginning with the lowest orders, constitutes the work of the winter term. Compound microscopes are constantly in use, and the laboratory work is made the basis of instruction, variously aided and extended by the study of the text book and by lectures. Special attention is given to injurious fungi.

   The third term is devoted to vegetable physiology and includes: the extent and causes of the movements of fluids in the tissues, the absorption of nutrient materials, respiration, transpiration, and assimilation; the causes, peculiarities, and results of growth; the relations and effects of external agencies, as heat, light, gravitation; self- and cross-fertilization; variation and heredity; movements and sensitiveness. The instruction is given by lectures and recitations, supplemented by required observations and experimental practice. *Bessey's Botany; Goebel's Outlines of Classification and Special Morphology; Vine's Lectures on Vegetable Physiology. Fall, winter, and spring terms, 10 hours a week.* Professor BURRILL.

   Required: Chemistry, 1; Art and Design, 4.

2. Bacteriology.—Bacteria and allied organisms are now known to play exceedingly important roles in nature, and in the daily life and well being of man. This course is an introduction to existing knowledge upon the subject, and offers instruction in the modern methods of experimentation and research. The laboratory is well equipped for a limited number of students. Only those who can give extra time when occasion demands should undertake the work. Lectures and assigned reading accompany the laboratory work. *Fall term, 10 hours a week.* Professor BURRILL.

   Required: Botany, 1; Chemistry, 1; Art and Design, 4.

3. Fungi.—There is offered in this course an opportunity for advanced work in special groups of plants to which an introduction is made in the winter term of course 1. The determination and classification of species and studies upon life histories largely occupy the time. The methods of bacteriology are used in the cultivation of fresh material. Students who propose to take the course should give notice of the fact at the beginning of the year or earlier, and should make collections for themselves. Laboratory work constitutes the principal part of the course. *Winter term, 10 hours a week.* Professor BURRILL.

   Required: Botany, 1, 2; Chemistry, 1; Art and Design, 4.

4. Plant Reproduction and Development.—Studies are made upon self- and cross-fertilization, embryology, and development, and upon special topics in physiology. Laboratory work supplemented by lectures and assigned reading. *Strasburger's Practical Botany: Detmer's Pflanzenphysiologisches Prakticum. Spring term, 10 hours a week.* Professor BURRILL.

   Required: Botany, 1; Chemistry, 1; Art and Design, 4.

5. Investigations and Thesis.—Facilities are offered for original investigations upon selected subjects upon which may be based a thesis required for a degree. Special arrangements should be made with the instructor during the preceding year or at least not later than the beginning of the year in which the work is to be taken. *Laboratory work, 10 or more hours a week.* Professor BURRILL.

   Required: Botany, 1; Chemistry, 1; Art and Design, 4.

6.—General Botany.—This minor course is offered to students who have but a single term of botanical study. An endeavor is made to present a general view of the science and to provide an introduction to modern methods of work. Lectures are given and two to four hours a week of laboratory field work are required. *Spring term, 7 hours a week.* Professor BURRILL.

   Required: Chemistry, 1.

ZOOLOGY.

Zoölogy is taught in five courses: (1) a major course (restricted elective) of a full year, two hours a day, primarily for students of natural science; (2) a term of embryology for those who have taken course 1; (3) two terms (senior) for those who have taken courses 1

and 2, and who select a zoölogical subject for the graduating thesis; (4) a year's work (open elective) in systematic zoölogy, for advanced students only; and (5) a general course of a single term, offered as a minor course in the school of natural science and as an elective to the students of the University at large.

1. General Zoölogy, Major Course.—It is the immediate object of this major elective course to make working zoölogists, and its secondary object to draw from zoölogical science its distinctive discipline as an element in a liberal education. It is planned with a view to giving to students a wide acquaintance with the methods of zoölogical research in field, laboratory, and library, and a sound and accurate knowledge of zoölogical theory and of the leading facts of observation and experiment upon which such theory rests. As it is presumed that all taking this course will have had a major course in botany, the laboratory work of the fall term (on the earthworm and on Hydra) is made an introduction to the special methods of the zoölogical laboratory. The remainder of the term is given to the Protozoa and Cœlenterata, the former of which are studied at length in the laboratory and lecture room in respect to their structure, physiology, and classification; their relations to plants; and their relations to the organization, embryology, and developmental history of the higher animals. These subjects are used to elucidate and illustrate the general theory of zoölogy, which is here presented in outline, to be completed and filled in as the work of the course proceeds.

   The second term is devoted to the morphology, physiology, and general classification of the remaining invertebrates, with principal attention to the Arthropoda. Early in this term a course of lectures on general embryology is given, with principal reference to the development of the earthworm as a type. The laboratory work includes the thorough study, by each member of the class, of an assigned species as a semi-independent investigation, the results of which are presented at the end of the term in a paper and drawings.

   The third term's work is done on vertebrates, with principal attention in the laboratory to anatomical methods for the larger animals. The work of this term includes also a series of studies made by the class together upon the smaller aquatic animals of the neighborhood, taken as a biological group.

The more important features of the method in this course are comparative dissections, descriptions, drawings, and microscopic preparations of types of the greater groups as a basis for the study of the subkingdoms and their more important divisions; lectures on the comparative physiology of selected forms, with especial reference to their relations to their environments, organic and inorganic, present and past; studies of the zoölogical classification, commonly introduced by analytical synopses. exhibiting the technical relations of groups. together with lectures and elaborate reviews directed especially to the general system of homologies by which zoölogical science is organized as a coherent whole. *One year, 10 hours a week.* Professor FORBES.

Required: Chemistry, 1; Botany, 1 or 6. Physiology, 1, must be taken with the first term's work of this course, if not before.

2. Embryology.—A course in practical and general embryology is given in the fall term as a sequel to course 1. It is required of all students intending to present a zoölogical thesis, except such as take course 4. It includes laboratory work upon the development of the chick, with assigned reading in general embryology for half a term. and an equal amount of reading on the evolution of animal life. *Fall term. 10 hours a week.* Professor FORBES.

   Required: Zoölogy, 1.

3. Investigations and Thesis.—Candidates for graduation in the College of Science who select a zoölogical subject as a thesis, are required to spend at least two hours a day for the winter and spring terms of their senior year in making an independent investigation of some selected zoölogical subject. While this work is done under the general supervision of an instructor. it is in its methods and responsibilities essentially original work.

4. Systematic Zoölogy (including Entomology).—To students who have course 1 an opportunity is offered for a year's work, two hours a day, in systematic zoölogy (including entomology), to be taken individually, under the guidance of an instructor. It may be closely adapted to the bent and ability of the student. It should consist essentially of determinative and descriptive work upon selected groups, and must be concluded with a synoptic or monographic paper upon some group of animals, based upon personal study.

For students of this course very unusual facilities are at hand in the library and collections of the State Laboratory of Natural History, which occupy rooms adjoining those of the zoölogical department of the University. *One year, 10 hours a week.* Professor FORBES.

Required: Zoölogy, 1.

5. General Zoölogy, Minor Course.—For the benefit of students of natural science specializing in some other direction, as well as for literary students desiring some general knowledge of zoölogy, a course of a single term is offered which contains enough laboratory and descriptive work to give a practical idea of the method of zoölogical science, and a sufficient number of lectures, with study of text, to cover the general subject in a cursory manner. Principal attention is paid to the Protozoa, to insects, and to birds. *Winter term, 10 hours a week.* Professor FORBES.

The texts most frequently used in the foregoing courses are Sedgwick's Claus, in general zoölogy, Haddon's Introduction to the Study of Embryology, and Foster and Balfour's Elements, in embryology. The dissections and other morphological studies are made with the aid of laboratory manuals prepared in the department and furnished to students in cyclostyle print. The determinative work of the course is guided by synopses, descriptive papers, and the like, also prepared in the laboratory and reproduced by the cyclostyle. A very full series of laboratory guides and manuals is at hand for reference. *Winter and spring terms, 10 hours a week.* Professor FORBES.

Required: Zoölogy, 1.

ENTOMOLOGY.

1. General and Economic Entomology.—A single course for the especial benefit of the school of natural science, is offered in this subject. It is designed mainly as a preparation for economic work and investigation as a specialty; but students whose principal interest is in structural or systematic entomology, may take a special line of such work in the second term.

   A large part of the time is devoted to the study of the characters, life histories, habits, and economic relations of a selected list of especially important insects. Specimens of these in their different stages, together with synopses and descriptions of the

families to which they belong, are furnished the students, and the essential facts not discoverable by direct observation, are given in lectures or acquired by study of text.

Practice in field observation is given as opportunity offers, and all are taught the ordinary methods of the collection, preparation, and care of specimens, together with the approved methods of controlling the ravages of the injurious species.

A personal study, continuous for a term, of the life history and habits of some insect species is made by each student, and is finally reported in the form of a thesis.

In both field and laboratory an extraordinary opportunity is offered to competent students of this course to observe and assist in practical entomological work and original research. *Winter and spring terms, 10 hours a week.* Professor FORBES.

Required: Zoölogy, 1, or Zoölogy, 5; Botany, 1.

PHYSIOLOGY.

1. Human Physiology.—The students admitted to this class have already passed an entrance examination in the elementary principles of anatomy and physiology.

The main objects of the course are to make the student familiar with the position, structure, and healthy action of those organs most liable to become diseased; to make plain the part which the nervous system plays in both the healthy and morbid action of the various organs, and in the problems of nutrition and energy.

The subject is taught during the fall term of the junior year. The plan embraces lectures, recitations from the text book, frequent readings from standard authors, and demonstrations from fresh dissections, alcoholic specimens, microscopical preparations, skeletons, and the manikin. *Martin's Human Body. Fall term, 5 hours a week.* Professor ROLFE.

Required: Chemistry, 1.

GENERAL BIOLOGY.

1. General Advanced Biology.—For those who have taken a major course in either botany or zoölogy, a single term of general biology is arranged and especially commended. It is intended

to review, extend, systematize, and unify the student's knowledge of the phenomena, the history, and the laws of life, of the relations of plant and animal, of living and not living matter, and of biology to other sciences and to philosophy. It will be taught chiefly by lectures and by assigned reading. It is properly a senior study for students of the school of natural science. *Spring term, 10 hours a week.* Professor FORBES.

Required: Botany, 1, or Zoölogy, 1.

ANTHROPOLOGY.

1. Anthropology.—The objects of this course are to summarize the facts and theories relating to the origin of man: to introduce the comparative study of races with a view to ascertaining their relations to each other and to primitive man; and to study the steps by which races change from the savage to the enlightened stage. The instruction is given by lectures, reading, and recitations. *Tylor's Anthropology. Fall term, 3 hours a week.* Professor ROLFE.

The following subjects, offered to students in the College of Science are described elsewhere as noted—

In the College of Agriculture—
 Veterinary Science, 3.
In the College of Engineering—
 Mathematics, 1, 3 (and 5 elective); Astronomy, 1; Physics, 1, 2; Electrical Engineering, 1.
In College of Literature—
 Philosophy, 1, 2, 3, 4; Pedagogy, 1, 2, 3; History, 1, 2, 4; French, 4, or 1 and 2; German, 1, 2; Political Economy, 1; English Literature, 1 and 2, or 6, 7, 8; Rhetoric and Oratory, 1.
In School of Military Science—
 Military Science, 1, 2.
In School of Art and Design—
 Art and Design, 4.

SCHOOL OF CHEMISTRY.

The aim of the instruction in this school is to impart such a knowledge of chemistry as will enable the student to apply the principles of the science to the work of the druggist, pharmacist, and practical chemist, as well as to investigations of chemical problems

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CHEMICAL LABORATORY

and to original research. The scope of the work is sufficiently broad to enable the student to specialize in the various callings open to the chemist and pharmacist. For the first three years specific courses are arranged, but much of the laboratory work of these courses may be varied to suit the purposes or the needs of the individual student. The fourth year is mainly occupied with investigation along special lines, the subject being chosen under the direction and with the advice of the professor in charge, with particular reference to the student's aims.

Students, not members of the College of Science, who desire to pursue studies in the chemistry of agriculture, or in metallurgy, may have ample opportunity for such work on consultation with the professor in charge.

CHEMICAL LABORATORIES.

A building 75 x 120 feet, and four stories in height is devoted to chemistry. The basement contains a furnace room for assaying provided with crucible and muffle furnaces, and a large store room for chemicals and apparatus. The first story contains a lecture room capable of seating 200 persons, and a laboratory for practice in general experimental chemistry and qualitative analysis, large enough to accommodate 152 students; 104 desks are now fitted up, each having an evaporating hood, gas, and water. There are a spectroscope table, a blowpipe table, and a store room stocked with apparatus and chemicals. Also, a good sized room fitted for the preparation of lecture experiments, and for storing apparatus, etc. The second story, designed for the use of advanced students, has the following apartments: A lecture room, a large laboratory for quantitative analysis and general advanced work, now containing 64 desks; a large well lighted balance room, containing analytical balances of the best European and American make; a pharmacy furnished with drugs and pharmaceutical preparations; private laboratory for instructors; and a gas analysis room entirely cut off from the system of heating, in order to avoid fluctuations of temperature. The laboratories are amply supplied with stocks of chemicals and apparatus of the most approved description and quality, for the work in the various branches of the science.

CLASSIFICATION OF SUBJECTS AND REQUIREMENTS FOR GRADUATION.

Forty-one credits for full terms of work, thirty-two of which shall be taken from the following list of required subjects, including

military, are required for graduation from the chemical courses. For the nine remaining credits five subjects must be chosen from the restricted electives and the others may be taken from these or from the open electives.

REQUIRED STUDIES.	RESTRICTED ELECTIVES.
Chemistry (1 to 5), 13 credits.	Botany (6 or 1), 1 or 3 credits.
German (1, 2), 5 credits.	Zoölogy (5 or 1), 1 or 3 credits.
French (4), 3 credits.	Geology (4 or 1), 1 or 3 credits.
Mathematics (1, 3), 2 credits.	Physiology, 1 credit.
Physics (1), 3 credits.	Political Economy, 1 credit.
Philosophy (1), 1 credit.	Philosophy (2, 4) 2 credits.
Mineralogy, 1 credit.	History (4), 1 credit.
Military, 2 credits.	
Rhetoric and Oratory (1), 2 credits.	

OPEN ELECTIVES.

Chemistry (advanced work) 1 to 3 credits.
Electrical Engineering (1), 1 credit.
English Literature (1, 2, 3), 1 or 3 credits.
Bacteriology, 1 credit.
Materia Medica, 1 or 2 credits.
Metallurgy, 1 credit.
Art and Design (5), 1 credit.
Pedagogy (1 to 6), 1 to 3 credits.
Astronomy (4), 1 credit.
Mathematics (5, 7), 1 or 4 credits.

COURSES OF STUDY.

Regular Course.

The following course is that required of regular chemical students.

FIRST YEAR.

1. Chemistry (1); Advanced Algebra; French; Military.
2. Chemistry (2); Trigonometry; French; Military.
3. Chemistry (2); Conic Sections; French; Military.

SECOND YEAR.

1. Chemistry (3); Physics; German; Military.
2. Chemistry (3); Physics; German; Military.
3. Chemistry (3); Physics; German; Military.

THIRD YEAR.

1. Chemistry (3); German; Mineralogy; Themes and Elocution.
2. Chemistry (4); German; Elective; Themes and Elocution.
3. Chemistry (4); Two Electives; Themes and Elocution.

FOURTH YEAR.

1. Chemistry (5); Two Electives.
2. Chemistry (5); Two Electives.
3. Chemistry (5); Two Electives.

SUGGESTED COURSES.

The electives in the above course occur exclusively in the third and fourth years. As a guide in the choice of elective subjects the following suggested courses are submitted.

COURSE 1.

THIRD YEAR.

1. Chemistry (3); German; Mineralogy; Themes and Elocution.
2. Chemistry (4); German; Geology; Themes and Elocution.
3. Chemistry (4); Botany; Geology; Themes and Elocution.

FOURTH YEAR.

1. Chemistry (5); Mental Science; Zoölogy.
2. Chemistry (5); Constitutional History; Zoölogy.
3. Chemistry (5); Political Economy; Zoölogy.

COURSE 2.

THIRD YEAR.

1. Chemistry (3); German; Mineralogy; Themes and Elocution.
2. Chemistry (4); German; Geology; Themes and Elocution.
3. Chemistry (4); Metallurgy; Geology; Themes and Elocution.

FOURTH YEAR.

1. Chemistry (5); Physiology; Mental Science.
2. Chemistry (5); Zoölogy; Logic.
3. Chemistry (5); Botany; Political Economy.

COURSE 3.

THIRD YEAR.

1. Chemistry (3); German; Botany; Themes and Elocution.
2. Chemistry (4); German; Botany; Themes and Elocution.
3. Chemistry (4); Astronomy; Botany; Themes and Elocution.

FOURTH YEAR.

1. Chemistry (5); Mineralogy; Mental Science.
2. Chemistry (5); Geology; Constitutional History, or Logic.
3. Chemistry (5); Geology; History of Philosophy, or Political Economy.

Course 4.

THIRD YEAR.

1. Chemistry (3); German; Physiology; Themes and Elocution.
2. Chemistry (4); German; Zoölogy; Themes and Elocution.
3. Chemistry (4); Chemistry Special; Botany; Themes and Elocution.

FOURTH YEAR.

1. Chemistry (5); Mental Science; Mineralogy.
2. Chemistry (5); Pedagogy; Materia Medica.
3. Chemistry (5); Pedagogy; Materia Medica.

Course 5.

THIRD YEAR.

1. Chemistry (3); German; Physiology; Themes and Elocution.
2. Chemistry (4); German; Zoölogy; Themes and Elocution.
3. Chemistry (4); Electrical Measurements; Botany; Themes and Elocution.

FOURTH YEAR.

1. Chemistry (5); Chemistry Special; Mineralogy.
2. Chemistry (5); Chemistry Special; Constitutional History, or Logic.
3. Chemistry (5); History of Philosophy; Political Economy.

Course 6.

THIRD YEAR.

1. Chemistry (3); German; Mental Science; Themes and Elocution.
2. Chemistry (4); German; Zoölogy; Themes and Elocution.
3. Chemistry (4); Astronomy; Botany; Themes and Elocution.

FOURTH YEAR.

1. Chemistry (5); Chemistry Special; Mineralogy.
2. Chemistry (5); Chemistry Special; Geology.
3. Chemistry (5); Chemistry Special; Geology.

Course in Pharmaceutical Chemistry.

FIRST YEAR.

1. Chemistry (1); Mathematics; French; Military.
2. Chemistry (2); Mathematics; French; Military.
3. Chemistry (2); Mathematics; French; Military.

SECOND YEAR.

1. Chemistry (8); Botany; German; Milltary.
2. Chemistry (8); Botany; German; Military.
3. Chemistry (8); Bctany; German; Military.

THIRD YEAR.

1. Chemistry (8); Physiologv; Physics; Themes and Elocution.
2. Chemistry (4); Materia Medica; German; Themes and Elocution.
3. Chemistry (4); Materia Medica; German; Themes and Elocution.

FOURTH YEAR.

1. Chemistry (5); two Electives.
2. Chemistry (5); two Electives.
3. Chemistry (5); two Electives.

TWO YEARS' COURSE IN PHARMACEUTICAL CHEMISTY.

FIRST YEAR.

1. Chemistry (1); Botany; German; Military.
2. Chemistry (2); Botany; German; Military.
3. Chemistry (2); Botany; German; Military.

SECOND YEAR.

1. Chemistry (8); Chemistry (8); Physiology; Military.
2. Chemistry (8); Chemistry (4); Materia Medica; Military.
3. Chemistry (8); Chemistry (4); Materia Medica; Military.

SCHOOL OF NATURAL SCIENCE.

The courses in the school of natural science are especially intended to provide a general preparation for professions and business pursuits requiring more of an acquaintance with the methods and facts of science than with those of literature. More specifically they are designed:

(1) To afford a thorough and liberal education with a basis in science and the modern languages.

(2) To prepare for the pursuit of specialties in zoölogy, entomology, botany, general biology, and geology, as a scientific career.

(3) To lay a liberal foundation in biological work and study for a course of medicine.

(4) To prepare for the teaching of the natural and physical sciences, either in the higher schools or as a professional specialty.

Natural Science Building.

The natural science building erected in 1892, at a cost of $60,000, is 94 feet in width by 134 feet in length, and two stories in height, besides basement and attic. There is a spacious, well lighted, central hall, around which, on all sides, are situated laboratory, lecture, and subsidiary rooms, all lighted by an abundance of windows spaced for the best results. On the main floors there are eight laboratories for students' work and four for the professors' private use, four lecture halls, as many office rooms, and the requisite number of cloak rooms and closets. The basement and attic give abundance of room for storage and work, and may be used for laboratory purposes.

The building will be occupied at the beginning of the year 1892-3 and to it will be transferred the work in botany, zoölogy, physiology, mineralogy, and geology. These subjects have heretofore been mostly provided for in University Hall, where the respective laboratories have extensive equipments. The new laboratories will receive the apparatus and material now in hand, together with considerable additions to be made during the year. With these superior quarters and advantages the instruction in natural science will be still more prominent than heretofore in this rapidly growing work of the University. Present provision is also made in the building for the State Laboratory of Natural History, for the office of the State Entomologist, and for the office of the Agricultural Experiment Station.

Classification of Subjects and Requirements for Graduates.

The studies offered in this school are divided into three groups: (1) required studies, (2) restricted electives, and (3) open electives. Under the head of restricted electives both major and minor courses are given, the former the maximum offering and the latter the minimum requirement in their respective subjects.

No student may graduate from the school of natural science until he has completed all required courses as given in group 1, and has done at least nine terms' work on one major subject, or twelve terms' work on more than one from group 2; and taken at least minor courses in all the other subjects of this group in which such courses are offered. He must further have received forty full-term credits (including military) for University studies. The major courses must be chosen for a year at a time, and may not be changed without special permission.

NATURAL SCIENCE HALL

Group 1. Required Subjects.

French (4 or 1), 3 credits.
German (1, 2), 5 credits.
Mathematics (1, 3), 2 credits.
Art and Design (4), 2 credits.
History (4), or Political Economy (1), 1 credit.
Philosophy (1 or 3), 1 credit.
Military Science (1, 2), 2 credits.
Rhetoric and Oratory (1), 2 credits.

Group 2. Restricted Electives.

MAJOR COURSES.	MINOR COURSES.
Botany (1 to 5) 3, 6, or 8 credits.	Botany (6), 1 credit.
Zoölogy (1 to 4), 4, 6, or 9 credits.	Zoölogy (5), 1 credit.
General Biology, 1 credit.	Physiology, 1 credit.
Entomology, 2 credits.	Geology (4), 1 credit.
Mineralogy, 1 credit.	Physics (2), 1 credit.
Geology (1, 2), 3 or 5 credits.	Chemistry (1), 1 credit.
Physics (1), 3 credits.	
Chemistry (6, or 1 to 3), 3 or 6 credits.	

Group 3. Open Electives.

French (2), 3 credits.
English Literature (1 to 3, or 6 to 8), 3 credits.
History (1, 2), 4 credits.
Entomology, 2 credits.
Anthropology, ½ credit.
Descriptive Astronomy (1), 1 credit.
Meteorology, ½ credit.
Political Economy, 1 credit.
Pedagogy (1, 2, 3), 3 credits.
Philosophy, 2 credits.
Mathematics (5), 1 credit.

SUGGESTED COURSES OF STUDY.

The following arrangement of studies in definite courses is presented as an aid to election by students. The work of the freshman year must be taken in some one of these courses, but beyond this they have no binding force.

General Course in Biology.

Students desiring uniform major courses in the biological subjects, with a maximum amount of the related sciences and the modern languages, are advised to take substantially the following course. It is recognized by the Illinois State Board of Health as the equivalent of one year's study in a three years' medical course,

or of two years' medical study and one course of lectures in a four years' course in medicine.

FIRST YEAR.

1. Chemistry; Advanced Algebra; Physiology; Military.
2. Chemistry; Trigonometry; Drawing; Military.
3. Chemistry; Astronomy; Drawing; Military.

SECOND YEAR.

1. Botany; Physics; French; Military.
2. Botany, Physics; French; Military.
3. Botany; Physics; French; Military.

THIRD YEAR.

1. Zoölogy; Mineralogy; German; Themes and Elocution.
2. Zoölogy; Geology; German; Themes and Elocution.
3. Zoölogy; Geology; German; Themes and Elocution.

FOURTH YEAR.

1. Mental Science; Geology: German.
2. Thesis; Embryology; German.
3. Thesis; Political Economy; General Biology.

Special Biological Courses

Courses in botany and zoölogy are offered those wishing to specialize early in either of these sciences, and to avail themselves fully of all the resources of the University in the major subject chosen.

Course in Botany.

FIRST YEAR.

1. Chemistry; French; Advanced Algebra; Military.
2. Drawing; French; Trigonometry; Military.
3. Drawing; French; Astronomy; Military.

SECOND YEAR.

1. Botany; Physiology; German; Military.
2. Botany; Zoölogy; German; Military.
3. Botany; Zoölogy; German; Military.

THIRD YEAR.

1. Botany; ———; German; Themes and Elocution.
2. Botany; Physics; German; Themes and Elocution.
3. Botany; ———; ———; Themes and Elocution.

ZOOLOGICAL LABORATORY

FOURTH YEAR.

1. Elective; Mental Science; History of Civilization.
2. Botany (Thesis); Logic; ———.
3. Botany (Thesis); Political Economy; General Biology.

Course in Zoology.

FIRST YEAR.

1. Chemistry; French; Advanced Algebra; Military.
2. Drawing; French; Trigonometry; Military.
3. Drawing; French; Botany; Military.

SECOND YEAR.

1. Zoölogy; Physiology; German; Military.
2. Zoölogy; Physics; German; Military.
3. Zoölogy; Astronomy; German; Military.

THIRD YEAR.

1. Zoölogy; ———; German; Themes and Elocution.
2. Zoölogy; ———; German; Themes and Elocution.
3. Zoölogy; Geology; ———; Themes and Elocution.

FOURTH YEAR.

1. Elective; Mental Science; History of Civilization.
2. Zoölogy (Thesis); Logic; ———.
3. Zoölogy (Thesis); Political Economy; General Biology.

Science Teachers' Courses.

Those who wish to fit themselves especially for teaching zoölogy, botany, and geology, in high schools, academies, seminaries, and the like, may advantageously substitute some of the pedagogical subjects of the course in philosophy and pedagogy, for German, mental science and political economy in the above general course in biology.

Similarly, pedagogical subjects may be elected by those taking special botanical or zoölogical courses and wishing to prepare for the teaching of botany or zoölogy as a specialty.

General Science Course.

For those desiring to qualify themselves in physics and chemistry with special reference to teaching, the following science course has been arranged. Pedagogical or other subjects may be taken as electives in the junior and senior years.

FIRST YEAR.

1. Chemistry; Advanced Algebra; French; Military.
2. Chemistry; Trigonometry; French; Military.
3. Chemistry; Conic Sections; French; Military.

SECOND YEAR.

1. Chemistry; Physiology; German; Military.
2. Chemistry; Zoölogy; German; Military.
3. Chemistry; Botany; German; Military.

THIRD YEAR.

1. Physics; Mineralogy; German; Themes and Elocution.
2. Physics; Geology; German; Themes and Elocution.
3. Physics; Logic; Geology; Themes and Elocution.

FOURTH YEAR.

1. Geology; ———; ———.
2. History; ———; ———.
2. Psychology; ———; ———.

Course Preparatory to Medicine.

For students intending to study medicine, and not wishing to take a full biological course, a two years' course is offered, not leading to a degree.

1. Chemistry; Physics; Botany; Military.
2. Chemistry; Anatomy; Botany; Military.
3. Chemistry; Physics; Botany; Military.

1. Zoölogy; Physiology; French or Latin; Drawing; Military.
2. Zoölogy; Embryology; French or Latin; Drawing; Military.
3. Zoölogy; Histology; French or Latin; Drawing; Military.

COLLEGE OF LITERATURE.

School of English and Modern Languages; School of Ancient Languages; School of Philosophy and Pedagogy.

FACULTY.

Thomas J. Burrill, Ph.D., Acting Regent, Botany.
Edward Snyder, M.A., German.
James D. Crawford, M.A., History.
James H. Brownlee, M.A., Rhetoric and Oratory.
Nathaniel Butler, Jr., M.A., English Language and Literature.
Frank F. Frederick, Industrial Art and Design.
Elbridge R. Hills, First Lieut., U.S.A., Military Science.
——— ———, Psychology.
Herbert J. Barton, M.A., Latin.
M. R. Paradis, M.A., French.
Charles M. Moss, M.A., Ph.D., Greek.

MEMBERS OF OTHER FACULTIES GIVING INSTRUCTION IN THIS COLLEGE.

Samuel W. Shattuck, C.E., Mathematics.
Stephen A. Forbes, Ph.D., Zoölogy.
Charles W. Rolfe, M.S., Geology.
Arthur W. Palmer, Sc.D., Chemistry.
Samuel W. Parr, M.S., Chemistry.
Samuel W. Stratton, B.S., Physics.
George W. Myers, M.L., Mathematics.

OBJECT OF THE COURSES.

The object of the courses in this College is to furnish a sound and liberal education to fit students for the general duties of life, and especially to prepare them for those business pursuits which require a large measure of literary and scientific knowledge and training. They meet the wants of those who wish to prepare themselves for

the labors of the press as editors and publishers, for teachers in the higher institutions, or for the transaction of public business.

INSTRUCTION.

The plan of instruction embraces, besides the ordinary text book study, lectures and practical exercises in all the departments, including original research, essays, criticism, and other work intended to illustrate the studies pursued, and to exercise the student's own powers.

A prominent aim will be to teach the right use of books, and thus to prepare the students for self-directed investigation and study, which will extend beyond the curriculum of his school and the period of his graduation. With this view, constant use of the already ample and continually enlarging stores of the library will be required and encouraged.

The library is well supplied with works illustrating the several periods of English, American, French, and German literature, as also those of ancient literature. It contains at present over twenty thousand well selected volumes, and is constantly growing by purchase at home and abroad. Valuable American and foreign periodicals are received regularly in the reading room.

The facilities for the intelligent study of Latin and Greek have been greatly increased by the purchase of a large number of maps, pictures, and views illustrating the life, art, and architecture of Greece and Rome. These are mounted or framed and placed in the recitation room, and are constantly studied in connection with the class work. In this way a realism is given to the literary and artistic achievements of these great peoples; and with access to a good equipment in other respects and a good art gallery, the student of ancient languages is in a position for intelligent and enjoyable study.

The class room devoted to English literature is furnished with portrait engravings, etc., of the principal authors studied, and other illustrative equipments, while the work in elocution is aided by models in *papier maché* of the vocal organs.

PHILOSOPHY.

[The courses in Philosophy are open to such students only as have completed two years of University work.]

1. Mental Science.—The subjects customarily studied under this head are (*a*) the mental subject, and (*b*) its functions. This in-

LIBRARY

volves a discussion of the ego as a personality, and as evincing certain capacities, and hence to an enumeration and examination of such capacities, with a view of determining the conditions under which they fulfill their function. Under sensation, the primary mental fact, arises a consideration of the relation of mind and the nervous system. Lectures upon this important subject are given to supplement the usual text book discussions. Analysis of certain phases of thought leads to a consideration of the question whether knowledge does not contain some elements for the production of which the mind alone is responsible. (The intuitive and contrary views.) The primary view of the study is to examine the mind as an activity: but sight is not lost of the opportunity afforded to awaken self-reflection, and thus, together with the implications of the subject itself, to make it a propædeutic to further researches in the philosophical branches. *Fall term, 5 hours a week.* ——— ———

2. Introduction to Philosophy.—Nature and problems of philosophy. Relation of philosophy to the particular sciences. Presuppositions of experience; space, time, ideas of cause, effect, self-cause or self-activity; dependent and independent beings; dogmatism, scepticism, and criticism: theory of knowledge: philosophy of nature and of mind, ethics: æsthetics: tendencies and schools in philosophy. *Winter term, 5 hours a week.* ——— ———

3. Logic.—This study lies at the basis of the natural or logical organization of the studies of the curriculum. Any given topic in arithmetic, for example, is logically preceded and followed by others. Logic also gives a key to the deeper or philosophical discussion of the problems of mind. Some of its topics are as follows:

   Principles of logic: conditions of valid thinking: forms of arguments: fallacies and their classification; inductive and deductive reasoning; principles and methods of investigation; practical applications of logic in the construction of arguments, in the detection and answer of fallacies, and the formation of the habits of thinking and common judgment of life. *Winter term, 5 hours a week.* ——— ———

4. History of Philosophy.—The systems of ancient, and part of those of modern philosophy are studied using Schuyler's History of Philosophy as a basis of work. Supplementary lectures and discussions aim mainly to enforce the notion of philosophy as a

legitimate field of investigation, to set forth its struggle to present an acceptable ontology and to explain the theories of cognition growing out of the presuppositions of the different systems. The points of harmony and discord between the systems are elaborated, the purpose being to extract from each whatever seems best authenticated by this comparative study. *Spring term, 5 hours a week.* ——— ———

PEDAGOGY.

1. Educational Psychology.—Its chief purpose is the awakening of the pedagogical consciousness. Some of its topics are: The production of sense perceptions; clear and obscure consciousness; laws for the reciprocal action of ideas; reproduction and memory: the imagination and its significance for instruction and moral training: apperception and its supreme importance in education; attention; the fate of concepts; thinking; the judgment, the syllogism; formation and kinds of notions; fancy; the ego as concept of the body, as meeting place of concepts; the historical ego; "we" as social ego; feelings, their content, tone, strength, and duration; relation of feelings to concepts; kind of feeling; desire, and its relations to thought and feeling; classification of desires; will and its rise and development; freedom in mental states; reflection and self-determination; psychological freedom; reason; character. *Fall term, 5 hours a week.* ——— ———

2. Science of Instruction.—Purposes of instruction. Interest, direct, permanent, and many sided, the fundamental condition of all sound instruction. The selection, arrangement, and coordination of the matter of instruction; general methods of instruction, as in the apperception of individual notions, the nature and significance of generalizations in instruction (pedagogical significance of inductive methods); the fixing and utilizing of knowledge through concrete application; practical applications of the foregoing through model exercises prepared by the students. *Winter term, 5 hours a week.* ——— ———

3. Special Methods in Education.—This work includes a full pedagogical treatment of each of the common branches, as reading, language, arithmetic, grammar, history, drawing, etc. It seeks

to answer such questions as the following: What are the essential or governing ideas in this subject? What is the natural order of their development? What phases of this natural or logical development correspond to the various phases in the development of the child; or, what would an ideal course of study show in each grade, so far as the subject is concerned? How must the general laws of instruction be applied to this special subject? What is the history of this study in school education, as to its introduction and development, as to the development of methods of teaching it? What is the specific educational value of this subject in the discipline of mind and in practical usefulness? What is its relation to the other subjects of the curriculum? *Spring term, 5 hours a week.* ——— ———.

4. School Supervision.—Historical view of school supervision in the United States; character of school supervision; state, county, and city supervision; the city superintendent of schools, his relation to pupils, to teachers; gradation and course of study; promotions; relation of superintendent to parents, to physical and moral training of pupils, to government and discipline; his relation to the board of education, to agencies for the improvement of teachers. *Fall term, 5 hours a week.* ——— ———.

5. History of Education.—The history of education traces the growth of educational ideals, showing how these are determined by national institutions and modes of thought, and also how these ideals in turn help to shape the further development of national life. Special attention is given to the growth of modern pedagogical doctrines, notably those of Comenius, Rousseau, Pestalozzi, Herbart, and Froebel on the continent, and those of Locke, Bain, and Spencer in England. The central and determining principle of each educational movement or system is sought and carried to its logical conclusion. These principles are then articulated and exhibited in their organic development. The history of education is thus no longer a chaos of unrelated or repeated facts, but an organic whole, capable of being understood and remembered. In addition to this organic general view, each of the important notions of education, such as the principles of right methods, is traced in its development and transformations through the modern systems of education. *Winter term, 5 hours a week.* ——— ———.

6. Philosophy of Education.—The basis of this work will be Bain's Education as a Science, and Rosenkranz's Philosophy of Education. *Spring term, 5 hours a week.* ——— ———.

POLITICAL ECONOMY.

1. Political Economy.—At present a single term's work is given in this subject, devoted to the study of standard text books and to assigned reading. *Spring term, 5 hours a week.* Professor CRAWFORD.

HISTORY.

The study of history extends through the junior and senior years and includes general history, the history of civilization, and the history of the English and United States constitutions. The work of the two years is intended to be continuous, each term being helped by the one preceding; but the study of the constitutional history of the United States is arranged separately for students who have not had the course in general history. The work of the course is presented by text books, topics, and lectures, and it is desired that students should obtain a considerable acquaintance with historical writers as well as facts.

1. General History.—Three terms are given to general history (some previous knowledge of the subject being assumed), in tracing the outlines of the world's progress from the first appearance of civilization. The work is intended to be much more than an outline, however, and cause and effect, the philosophy of history, are carefully looked to as preparing the way for the special study of the history of civilization which follows. *Fall, winter, and spring terms, 5 hours a week.* Professor CRAWFORD.

2. History of Civilization.—In this subject the early state of mankind and the history of progress from that state on through the Greek and Roman periods is presented in lectures, followed by a consideration of the civilization of modern Europe on the basis of Guizot's Lectures. References are made to a considerable range of literature, and essays on various topics are required. *Fall term, 5 hours a week.* Professor CRAWFORD.

   Required: History, 1.

3. Constitutional History.—In the first term the time is given to an historical study of the English constitution with special refer-

ence to principles and precedents belonging equally to modern England and the United States. In the second term an historical and critical study is made of the constitution of the United States. *Winter and spring terms, 5 hours a week.* Professor CRAWFORD.

Required: History, 1, 2.

4. Constitutional History.—For students who have not had the work in general history, a term is arranged giving a brief sketch of the principles of English government, and a study of the constitution of the United States. *Winter term, 5 hours a week.* Professor CRAWFORD.

GREEK.

The purpose of the instruction in this department may be stated as follows: First, to acquaint the student with the principles of the language itself, beginning with those most essential, and progressing toward those less so. A systematic carrying out of this purpose must lead to more rational results, and by an easier route, than is sometimes reached in linguistic study. Much stress is laid upon the fact that the laws of syntax are the laws of mental operation, and that a proper regard for the logical order of thought must lend help to translation. Every device at hand for impressing this fact upon the student will be persistently used. Extemporaneous translations will be required throughout the course as furnishing the most available application, under the stimulus of the class room, of the purpose enunciated. A second purpose is to employ the literature read as a basis for the consideration of those numerous problems of life and civilization which the Greeks attempted to solve. The debt of present civilization to the Greek movement is so large and so varied that abundant opportunity is afforded for a fruitful study of the growth and descent of ideas and institutions. Conversations upon the governmental, moral, educational, and esthetic ideas of the Greeks will be used to elucidate these questions, and students will be required to use the library, and the numerous photographs and other apparatus of instruction that will be at their command for further information in special work to be assigned from time to time.

The two purposes are, then, to deal rationally with the language as a language, and to make this study a fruitful source of information upon questions that must concern every thoughtful person.

Following is a detailed account of the work presented for the year 1892-3:

1. Selections from Herodotus.—Special studies in verb syntax. Ionic etymology. Greek prose. *Mather. Fall term, 5 hours a week.* Professor Moss.

2. Selections from Xenophon's Hellenica.—Studies in syntax. Greek prose. Consideration of the causes of the downfall of Athens. *Manatt. Winter term, 5 hours a week.* Professor Moss.
   Required: Greek, 1.

3. Xenophon's Memorabilia.—Studies in syntax. Consideration of the work of Socrates as a public teacher. *Winans. Spring term, 5 hours a week.* Professor Moss.
   Required: Greek, 1, 2.

4. Selections from the Orations of Lysias and Demosthenes.—Comparative study of the syntax of the two authors. Discussions upon the development of Greek oratory. *Stevens; Tyler; Tarbell. Fall term, 5 hours a week.* Professor Moss.
   Required: Greek, 1, 2, 3.

5. Plato's Apology; and Selections from the Phaedo.—Studies in the rhetoric and idiom of Plato. Outline of his philosophical views, so far as touched upon in the text read. *Wagner. Winter term, 5 hours a week.* Professor Moss.
   Required: Greek, 1, 2, 3, 4.

6. Aeschylus's Prometheus Bound, and Euripides' Alcestis.—Studies in the history and characteristics of the Greek drama. *Prickard; Jerram. Spring term, 5 hours a week.* Professor Moss.
   Required: Greek, 1, 2, 3, 4, 5.

7. Homer's Illiad.—Studies in the Homeric syntax. Lectures upon the civilization represented in the poems and upon the interpretative character of the two epics. *Seymour, or Keep. Fall term, 5 hours a week.* Professor Moss.
   Required: 1, 2, 3, 4, 5, 6.

8. Seminary.—Aristophanes' Clouds. Greek Comedy. Textual criticism. *Winter term, 5 hours a week.* Professor Moss.
   Required: 1, 2. 3, 4, 5, 6, 7.

9. Seminary.—Poets. Social character of lyric poetry. Comparaative study of the same. *Buchholz. Spring term, 5 hours a week.* Professor Moss.
   Required: Greek, 1, 2, 3, 4, 5, 6, 7, 8.

Latin.

1. (a) Livy.—Selections from the XXI. and XXII. books. A study of Hannibal and of the military systems of the times. A thorough review of syntax, when necessary, with a careful study of subjunctives.

   (b) Prose Composition.—The work is based on Livy, and that author's text in representative passages is made the subject of careful analysis. The writing is based on this analysis. *Fall term, 5 hours a week.* Professor Barton.

2. Cicero de Amicitia.—An introduction is here made to the philosophical system of the Romans. Grammatical drill is lessened and a constant endeavor is made to read with a view to appreciate the quality of the author. *Winter term, 5 hours a week.* Professor Barton.

   Required: Latin, 1.

3. Horace. Selections from the Odes.—The metres are carefully studied. The selections are designed to bring into prominence the beauty of the poet. Enjoyment as well as knowledge and discipline are sought. *Spring term, 5 hours a week.* Professor Barton.

   Required: Latin, 1, 2.

4. Tusculan Disputations.—The first book of the Disputations is read together with extracts from Cato Major, de Senectute, and Scipio's Dream. *Fall term, 5 hours a week.* Professor Barton.

   Required: Latin, 1, 2, 3.

5. Horace's Satires. Selections.—A careful study is made of the social life of the Romans. *Winter term, 5 hours a week.* Professor Barton.

   Required: Latin, 1, 2, 3.

6. Tacitus. The Germania and Agricola. Roman Archaeology.—The sculpture and painting of the Romans. *Spring term, 5 hours a week.* Professor Barton.

   Required: Latin, 1, 2, 3.

7. Quintilian.—Selections from the X. and XII. books. The whole field of classical literature is here studied and reviewed. *Fall term, 5 hours a week.* Professor Barton.

   Required: Latin, 1, 2, 3.

8. Juvenal's Satires.—Especial reference to the private life of the Romans. *Winetr term, 5 hours a week.* Professor BARTON.
   Required: Latin, 1, 2, 3.

9. Cicero de Officiis.—In this connection a study of the ethics of the Roman world. *Spring term, 5 hours a week.* Professor BARTON.
   Required: Latin, 1, 2, 3.

FRENCH.

Of the four courses provided in this subject the first three are intended for students of the language as such; the other for those who especially wish to make use of French in the prosecution of other studies. The former are mainly for students in literary courses and constitute three years of progressive work; the fourth course is for those whose chief attention is given to technical and scientific subjects.

1. For Students in College of Literature.—The course begins with a study of grammatical constructions, with exercises upon pronunciation, and with easy translations from French into English. As the work progresses greater attention is paid to grammatical rules and their applications and translations from English into French are required. Conversation is introduced as soon as the way opens. Careful attention is given to French pronunciation. *Super's Reader; Souvestre's Confessions d'un Ouvrier; Sandeau's M'lle de LaSeigilère. Fall, winter, and spring terms, 5 hours a week.* Professor PARADIS.

2. For Students in College of Literature.—This is a second year's work for those who have had course 1. It consists of readings and translations of various selections from classical and modern writers with a further study of syntax, of idioms, etc., and with exercises in composition and conversation. Essays in French are required. *Fall, winter, and spring terms, 5 hours a week.* Professor PARADIS.
   Required: French, 1.

3. For Students in College of Literature.—This is a third year's study following courses 1 and 2 and is elective by students who want to become further proficient in the language and literature. The instruction is given in French. *Fall, winter, and spring terms, 5 hours a week.* Professor PARADIS.
   Required: French, 1, 2.

4. For Students in Colleges of Agriculture, Engineering, and Science.—This is similar to course 1; but less attention is given to grammar and more to translation from French into English, in order that students may learn to read at sight works in various departments of science and art. *Super's Reader; Souvestre's Confessions d'un Ouvrier; Sandeau's M'lle de La Seiglière. Fall, winter, and spring terms, 5 hours a week.* Professor PARADIS.

ITALIAN AND SPANISH.

One year courses in these languages will be given in alternate years—the Italian course, in 1892–93; the Spanish, in 1893–4.

1. Italian.—Selected readings, composition, and conversational exercises. *Sauer's Italian Grammar and Reader. Fall, winter, and spring terms, 5 hours a week.* Professor SNYDER.
   Required: French, 1, or 4.

1. Spanish.—Selected readings, composition, and conversational exercises. *Knapp's Spanish Grammar and Reader.* Professor PARADIS.
   Required: French, 1, or 4.

GERMAN.

There are three years of instruction given in German. The first is devoted to the study of grammar. In the second a select course of reading is followed with exercises in composition and conversation. In the third the study is conducted in German; the history of literature is studied from a manual and by lectures, accompanied by critical reading of classic and latest authors.

1. For Students in College of Literature.—*Joynes-Meissner German Grammar; Joynes's German Reader. Fall, winter, and spring terms, 5 hours a week.* Professor SNYDER.

2. For Students in College of Literature.—Reading, composition, and conversation. Harris's German Composition, White's German Prose, and a selection of Classics. Gœthe's Iphigenie, or Hermann and Dorothea; Schiller's Maria Stuart, Wilhelm Tell, or Jungfrau von Orleans, etc. Also selections of modern prose. Frietag's Aus dem Staate Friedrich des Grossen; Jensen die Braune Erica; Fouqué's Undine, etc. *Fall, winter, and spring terms, 5 hours a week.* Professor SNYDER.
   Required: German, 1.

3. For Students in College of Literature.—The study in this year will be conducted in German, History of German Literature, Manual, Wenkibach Deutsche Literaturgeschichte. Lectures on same. Readings and reports on assigned reading. Texts, Gœthe's Faust (1st part), and Torquato Tasso; Lessing's Nathan der Weise, and Minna von Barnheim; Schiller's Wallenstein; Buchheim's Deutsche Lyrik, and selections from modern authors. *Fall, winter, and spring terms, 5 hours a week.* Professor SNYDER.
   Required: German, 1, 2.

4. Special one year's course for students in Colleges of Agriculture, Engineering, and Science. *Otis's German Grammar; Joynes's Reader; Gore's German Science Reader. Fall, winter, and spring terms, 5 hours a week.* Professor SNYDER.

ENGLISH LITERATURE.

The aim of instruction in this department is to acquaint the student with the resources of English literature, to teach him how to study its best productions, and to awaken and confirm in him a love for such study.

The methods adopted for securing these ends are intended also to involve general discipline equal to that afforded in the study of the ancient classics. All the courses except 6, 7, and 8 are required for the degree of B.L.

1. American Authors.—The first term of the freshman year is given to a general survey of American literature. This survey is mainly critical, rather than historical and biographical. The student is expected also to read and write a critique upon a book by an American author, selected from a prescribed list. The student also prepares and enters in a note book, a general historical outline of the whole subject, worked up by himself in the library of the University. *Scudder's American Prose and American Poems. Fall term, 5 hours a week.* Professor BUTLER.

2. British Authors.—The second and third terms of the freshman year are devoted to a similar survey of the literature of England since 1550. Here also the historical and biographical side of the study is kept subordinate to the critical. Using the texts as a basis of induction, the student is led to see for himself through what phases English literature has passed in its devel-

opment; he then supplements his own inferences by the opinions of the best critics, and writes one paper upon each of the great periods of modern English literature. The historical outline is made and entered in a note book, as in the case of American authors. *Hale's Longer English Poems; Garnett's English Prose from Elizabeth to Victoria. Winter and spring terms, 5 hours a week.* Professor BUTLER.

Required: English Literature, 1.

3. English Classics (Prose).—The first term of the sophomore year is occupied with the study of English prose masterpieces. The list of authors selected varies with each year. The work of the last term in this subject consisted of a study of Edmund Burke, Carlyle's Heroes and Hero Worship, and Bacon's Essays. The purpose of this study is to bring the mind of the student into contact with specimens of the best thought and sentiment embodied in English prose that he may learn how to get out of such productions what they have for him, and that he may develop a taste for this kind of study, such as will insure his voluntary continuance of it in the future. The student is also led to consider what a given author represents in the world of thought and sentiment, why one should read his works, and on what his claim to permanence rests. *Fall term, 5 hours a week.* Professor BUTLER.

Required: English Literature, 1, 2.

4. English Classics (Verse).—In the second term of the sophomore year a study is made of English poetry of the nineteenth century, as represented by Wordsworth, Tennyson, and Browning. Rolfe's Selections are used, and the student's judgment. based on careful study of the poems, is afterwards confirmed or corrected by a study of the best critical estimates of these writers, by such men as De Quincy, Lowell, Principal Shairp, Matthew Arnold, and Edward Dowden. Thus a very useful acquaintance is incidentally formed with the valuable literature of general criticism and interpretation, though this is kept subordinate and subsequent to the study of the text itself. *Rolfe's Selections. Winter term, 5 hours a week.* Professor BUTLER.

Required: English Literature, 1, 2, 3.

5. Shakspere.—The sophomores study Shakspere during the third term. One tragedy, one comedy, and one historical play con stitute the term's work. Familiar lectures are given upon the

origin and nature of the drama. Paraphrased narratives of parts of the plays are required, and one paper is written upon Shakspere. *Hudson's or Rolfe's Editions. Spring term, 5 hours a week.* Professor BUTLER.

Required: English Literature, 1, 2, 3, 4.

6. Old English (Anglo-Saxon; A. D. 650–1154).—This study is intended to lead the student to understand the origin and development of the English language and literature, and the relation of English to kindred languages. *Sweet's Anglo-Saxon Reader. Fall term, 5 hours a week.* Professor BUTLER.

   Required: English Literature, 1, 2, 3, 4, 5, or German, 1, 2.

7. Middle English (A. D. 1154–1362).—The work in middle English follows the term in old English and can be taken by those only who have done that work. *Morris's Specimens of Early English, Part 1. Winter term, 5 hours a week.* Professor BUTLER.

   Required: English Literature, 1, 2, 3, 4, 5, 6, or 6 and German 1, 2.

8. Science of Languages.—This work is for students who have done the work of the first and second senior terms. *Whitney's Life and Growth of Languages. Spring term, 5 hours a week.* Professor BUTLER.

   Required: English Literature, 1, 2, 3, 4, 5, 6, 7, or 6, 7, and German 1, 2.

RHETORIC AND ORATORY.

The object of the prescribed courses outlined below is not so much the acquisition of knowledge regarding English as skill in the use of English. They are chiefly designed to furnish the student with the ability to write well and to speak well,—to express their thoughts, both with the pen and with the voice, in a clear, effective manner.

1. Themes and Elocution.—Students from the Colleges of Agriculture, Engineering, and Science do their work in this department during their junior year. No text book is used; but in order that all practice in writing may be intelligent, a fair working knowledge of the principles of composition is conveyed in lectures. Ten themes are presented by each person, each of which, after correction by the instructor, is handed back to the student to be carefully re-written and returned to the instructor.

Further on in the work of the year is included a carefully graded series of twenty lessons in elocution. *Phyfe's How I Should Pronounce. Fall, winter, and spring terms, 3 hours a week.* Professor BROWNLEE.

2. Themes and Elocution.—Students from the College of Literature do the work of this department during the freshman and the senior years. Two hours a week throughout the freshman year are devoted to rhetoric and theme writing. Ten themes are required, and each, after correction, is re-written by the student. One hour a week throughout the senior year is devoted to oratorical delivery. Six lectures are given upon the art of oratory. *Genung's Practical Rhetoric. First year, 2 hours a week; fourth year, one hour a week.* Professor BROWNLEE.

3. Themes and elocution.—To meet the wants of those desiring a more extended training in elocution and oratory than is furnished by the prescribed course, an elective course is provided. *Fall, winter, and spring terms, 2 hours a week.* Professor BROWNLEE.

The following subjects, offered to students in the College of Literature, are described elsewhere as noted:

In College of Engineering—

Mathematics, 1, 3, 5, 7; Astronomy, 1; Physics, 1, 2.

In College of Science—

Chemistry, 1, 6, or 1, 2, 3; Mineralogy, 1; Geology, 5 or 1; Meteorology, 1; Botany, 6, or 1 to 4; Zoölogy, 5, or 1, 2, 4; Entomology, 1; Physiology, 1; Anthropology, 1.

CLASSIFICATION OF STUDIES AND REQUIREMENTS FOR GRADUATION.

Forty term credits (including military) constitute the requirement for a degree in literary courses. Every student must take the required subjects (11 terms), must select at least two majors of six terms each (12 terms) and three minors (3 terms) from the restricted electives, and may choose 14 or more subjects from the remaining majors and minors, or from the open electives; *Provided, That* each term one study must be chosen from the list prescribed by state law. For degrees of B. A. the two majors must be taken in Greek and Latin; for degree of B. L. the majors may be chosen in English, Latin, German, French, or Pedagogy.

Election of mathematics, physics, or chemistry from open electives excuses from required studies of same kind.

The prescribed studies must be taken at the time when they are set down in all suggested courses of study.

In electing studies students must be careful to observe the preparation required for each, as given under separate subjects; no deviation will be allowed.

REQUIRED SUBJECTS.

History—3 credits.
Mathematics—2 credits.
Chemistry—1 credit.
Physics—1 credit.
Themes and Elocution—2 credits.
Military—2 credits.

Restricted Electives.

MAJORS.

English—6 or 9 credits.
Greek—6 or 9 credits.
Latin—6 or 9 credits.
German—6 to 9 credits.
French—6 to 9 credits.
Pedagogy—6 credits.

MINORS.

Constitutional History—2 credits.
Political Economy—1 credit.
History of Civilization—1 credit.
History of Philosophy—1 credit.
Psychology—1 credit.
Logic—1 credit.

OPEN ELECTIVES.

Italian—3 credits.
Spanish—3 credits.
Oratory—$\frac{6}{5}$ credit.
Art and Design—3 or 6 credits.
Botany—1 to 3, or 6 credits.
Zoölogy—1 to 3, or 6 credits.
Chemistry—3 or 6 credits.
Geology—1 or 3 credits.
Physiology—1 credit.
Mathematics—3 or 6 credits.
Physics—3 credits.
Entomology—2 credits.
Mineralogy—1 credit.
Anthropology and Meteorology—1 credit.
Astronomy—1 credit.

SUGGESTED COURSES OF STUDY.

These courses are presented as an aid to election by students. The work of the freshman year must be taken as given in some one of these courses. Electives and specialties ought to be left for the junior and senior years, when the student has gained a more correct estimate of his own powers and preferences, as well as of his ultimate aim in life.

English Course.

FIRST YEAR.

1. American Authors: Mathematics; French, German, or Latin; Theme Writing: Military.
2. British Authors; Mathematics; French, German, or Latin; Theme Writing; Military.
3. British Authors; Astronomy; French, German, or Latin; Theme Writing; Military.

SECOND YEAR.

1. English Classics (Prose); Physiology: French or German: Military.
2. English Classics (Verse): Physics; French or German; Military.
3. English Classics (Shakespere): Botany; French or German; Military.

THIRD YEAR.

1. History: Chemistry; French or German: Italian or Spanish.
2. History: Zoölogy; French or German; Italian or Spanish.
3. History; Geology; French or German; Italian or Spanish.

FOURTH YEARS.

1. Old English (449–1066); Mental Science; History of Civilization; Elocution.
2. Middle English (1066–1362); Logic: History of the Constitution; Elocution.
3. Science of language: Political Economy; History of Philosophy; Elocution.

Modern Language Course.

FIRST YEAR.

1. American Authors or Latin; Mathematics; French, 1; Theme Writing.
2. British Authors or Latin; Mathematics; French, 1; Theme Writing.
3. British Authors or Latin; Astronomy; French, 1; Theme Writing.

SECOND YEAR.

1. French, 2: Physiology; German, 1: Free Hand Drawing; Military.
2. French, 2: Physics; German, 1; Free Hand Drawing; Military.
3. French, 2; Botany; German, 1; Free Hand Drawing; Military.

THIRD YEAR.

1. History; Chemistry; German, 2; Italian. Spanish, or French, 3.
2. History; Zoölogy; German, 2; Italian, Spanish, or French, 3.
3. History; Geology; German, 2; Italian, Spanish, or French, 3.

FOURTH YEAR.

1. Psychology; History of Civilization; Old English, Italian, Spanish, or German, 3; Elocution.
2. Logic; Constitutional History; Middle English, Italian, Spanish, or German, 3; Elocution.
3. Political Economy; History of Philosophy; Science of Language, Italian, Spanish, or German, 3; Elocution.

LATIN COURSE.

FIRST YEAR.

1. Latin; French, or German; Mathematics; Theme Writing; Military.
2. Latin; French, or German; Mathematics; Theme Writing; Military.
3. Latin; French, or German; Astronomy; Theme Writing; Military.

SECOND YEAR.

1. Latin; French, or German; Physiology; Free Hand Drawing; Military.
2. Latin; French, or German; Physics; Free Hand Drawing; Military.
3. Latin; French, or German; Botany; Free Hand Drawing; Military.

THIRD YEAR.

1. Latin; History; Chemistry; Pedagogy.
2. Latin; History; Zoölogy; Pedagogy.
3. Latin; History; Geology; Pedagogy.

FOURTH YEAR.

1. History of Civilization; Psychology; Early English, French, or German; Elocution.
2. Constitutional History; Logic; Middle English, French, or German; Elocution.
3. Political Economy; Constitutional History, or History of Philosophy; Science of Language, French, or German; Elocution.

CLASSICAL COURSE.

(With maximum of Science.)

FIRST YEAR.

1. Latin; Greek; Mathematics; Theme Writing; Military.
2. Latin; Greek; Mathematics; Theme Writing; Military.
3. Latin; Greek; Astronomy; Theme Writing; Military.

SECOND YEAR.

1. Latin: Greek; Physiology; Zoölogy, or Botany; Military.
2. Latin: Greek; Physics; Zoölogy, or Botany; Military.
3. Latin; Greek: Free Hand Drawing; Zoölogy, or Botany; Military.

THIRD YEAR.

1. Greek; History; Chemistry; English Classics.
2. Greek; History; Chemistry; English Classics.
3. Greek; History; Chemistry; English Classics.

FOURTH YEAR.

1. German, or French; Mental Science; Early English; Elocution.
2. German, or French; Logic; Middle English; Elocution.
3. German, or French; Political Economy: Science of Language; Elocution.

Classical Course.

(With maximum of modern language, or pedagogy.)

FIRST YEAR.

1. Latin; Greek; Mathematics; Theme Writing; Military.
2. Latin; Greek; Mathematics; Theme Writing; Military.
3. Latin; Greek; Astronomy; Theme Writing; military.

SECOND YEAR.

1. Latin; Greek; Physiology; Free Hand Drawing; Military.
2. Latin; Greek; Physics; Free Hand Drawing; Military.
3. Latin; Greek; Free Hand Drawing; Anthropology and Meteorlogy: Military.

THIRD YEAR.

1. German; History; Chemistry; Pedagogy.
2. German; History; Zoölogy; Pedagogy.
3. German; History; Geology; Pedagogy.

FOURTH YEAR.

1. German; French; Mental Science; History of Civilization; Elocution.
2. German; French; Logic; Constitutional History; Elocution.
3. German; French; Political Economy; History of Philosophy; Elocution.

Philosophy and Pedagogy.

The first and second years of this course may be those of either of the other courses in the College of Literature.

THIRD YEAR.

1. Mental Science; Psychology; Chemistry; History; French, German, or Latin.
2. Science of Instruction; Zoölogy; History; French, German, or Latin.
3. Special Methods; Geology; History; French, German, or Latin.

FOURTH YEAR.

1. School Supervision; Educational Psychology; History of Civilization; Early English; Elocution.
2. History of Education; Logic; Constitutional History; Middle English; Elocution.
3. Philosophy of Education; Political Economy; History of Philosophy; Science of Language; Elocution.

SCHOOL OF ART AND DESIGN.

Professor Frank Forrest Frederick.
Edith Adelaide Shattuck.

This school subserves a two-fold purpose. (1) It affords to the students of the several colleges the opportunity to acquire such a knowledge of free hand drawing as their chosen courses may require. (2) It offers to such as have a talent or taste for art the best facilities for pursuing studies in industrial designing or other branches of fine art.

Special students, not otherwise connected with the University, may enter this school upon payment of very moderate fees.

In all courses the work is made of direct benefit to the students in other lines, and at the same time it aims to develop in them a love for and an appreciation of the beautiful.

Work must be taken at the times indicated below and all students must satisfactorily complete the requirements of each term before taking up that of the next.

EQUIPMENT AND FACILITIES.

The art gallery is much used by students of this school. A description of this is given on page 14. The school owns a large number of casts of ornament from the Alhambra and other Spanish buildings, presented by the Spanish government. Also another valuable set of casts from Germany, illustrating German Renaissance ornament. In addition the school owns all the casts and models usually found in an art school, together with a large number of objects for still life. Students have the use of the collection of

American and foreign drawings and photographs, numbering several thousands, belonging to the department of architecture, and of the University library which is particularly rich in works on art. The principal English and American art magazines are found in the reading room.

Courses of Study.

1. For Special Students of Art and Design.—First year, first term. Principles of free hand drawing learned from drawing geometric solids (a) in outline, (b) in washes of water color, (c) in values of charcoal.

   Second term. Principles applied by drawing (a) groups of common objects, as books, vases, chairs, tables, etc.; (b) casts of ornament; (c) interior, as the corner of the room; (d) plants and flowers from nature.

   Third term. Study of anatomy, using Duval's Artistic Anatomy as text book, and drawing from Rimmer's Art Anatomy and Julien's Etudes D'Aprés l'Antique. Also outline drawing from the antique figure and shaded drawings. In charcoal, of details of the human figure and animal forms.

   Lectures are given throughout the year on design and the historic styles of ornament. Students are required to prepare (a) a monograph of the ancient mediaeval or modern styles, (b) original exercises showing principles and methods, (c) original exercises employing color.

   Lectures on perspective are given the second term and the problems then worked out are illustrated by sketches from nature made during the third term.

   Second year, first term. Modeling in clay (a) details of human face, (b) copy of cast of ornament, (c) ornament from photograph. Casts are made of (a) at least one modeled piece, (b) arm, hand, or foot from nature, (c) foliage, fruit, or vegetable from nature.

   Second term. Painting in oil color: (*a*) study in monochrome from still life: (b) group, as a study for composition and color.

   Third term. Painting in water color: (a) group, as a study for composition and color; (b) flower and foliage from nature; (c) sketching from nature.

   Design. (a) An original design for capital, panel, or spandrel--modeled and cast. (b) An original design for surface decoration in color.

Third year, first term. Advanced work in oil and water color painting, and sketching from nature in color.

Second term. Modeling (a) bas-relief from antique figure, (b) anatomical rendering of an antique figure, (c) bust from the antique, (d) portrait head from nature in round or relief.

Third term. (a) Shaded study of antique figure. (b) Portrait head from nature. (c) Sketching from nature in color.

Design. Details comprising the human, animal, plant, and insect forms for the purpose of design, and an original practical design employing part of this material. *Three years, 20 hours a week.* Professor FREDERICK.

2. For Students of Design.—First term, same as work in design of course 1: also study of the relation of design to manufacture.

Second term. Study of the color as a means of interior and exterior decorations. At least one color scheme to be worked out, full size, in tempera colors.

Third term. Practice in designing in the line of work of which the student wishes to make a specialty. *One year, 20 hours a week.* Professor FREDERICK.

Required: Art and Design, 1, first two years.

3. For Students of Architecture.—First year, first term, same as first term of course 1. Second term, same as course 1, except that special attention is given to the drawing of casts of ornament and interiors.

Third term, rendering perspective in washes of water color (sepia). Sketching from nature.

Design, same as in course 1.

Perspective, same as in course 1.

Instruction in pen sketching is given throughout the year, but most of the work must be done out of hours. Gregg's Architectural Rendering in Pen and Ink.

Second year, first term, same as in course 1. Second term, same as in course 1; or as in second term, third year, course 1; or as in second term, third year, course 2. Third term, same as in course 1; or as in third term, third year of course 1.

Design, same as in course 1. *Two years, 10 hours a week.* Professor FREDERICK.

4. For Students in College of Agriculture, and School of Natural Science.—First term, same as in course 1. Second term, same as in course 1, except that special attention is given to drawing

plant and animal forms from nature. Third term, use of pen and ink and water color in work relating to these courses.

Design, same as in course 1. *One year, 10 hours a week.* Professor FREDERICK.

5. For Students of Mechanical, Electrical, and Civil Engineering, and of Chemistry.—First term, same as in course 1. Second term, same as in course 1, except that special attention is given to drawing details of machinery and chemical apparatus. *Fall and winter terms, 10 hours a week.* Professor FREDERICK.

6. For Students in College of Literature.—The work in this course is the same as course 1, as far as time will allow, including design. Students are required to attend the lectures of course 7. *One or two year, 10 hours a week.* Professor FREDERICK.

7. Course in the History of Art.—Lectures with collateral reading. Selections from Ruskin, Sir Joshua Reynolds, Viollet le Duc, Day's Work on Ornament, Penot and Chipiez' and Reber's histories of art, and other works relating to the history and methods of painting, sculpture, and architecture.

These lectures are illustrated by several hundred lantern slides and are open to all students of the department. *One year, 1 hour a week.* Professor FREDERICK.

SCHOOL OF MILITARY SCIENCE.

PROFESSOR ELBRIDGE R. HILLS,
1st Lieutenant 5th Artillery, U.S.A.

The military instruction is under the charge of 1st Lieutenant Elbridge R. Hills, a graduate of the U. S. Military Academy, and an officer of the regular army of the United States. The course as a whole has special reference to the duties of officers of the line. A full supply of arms and ammunition is furnished by the War Department, including 300 cadet rifles and accoutrements, and two field pieces of artillery. Ammunition is supplied for the practice and target firing and for artillery use.

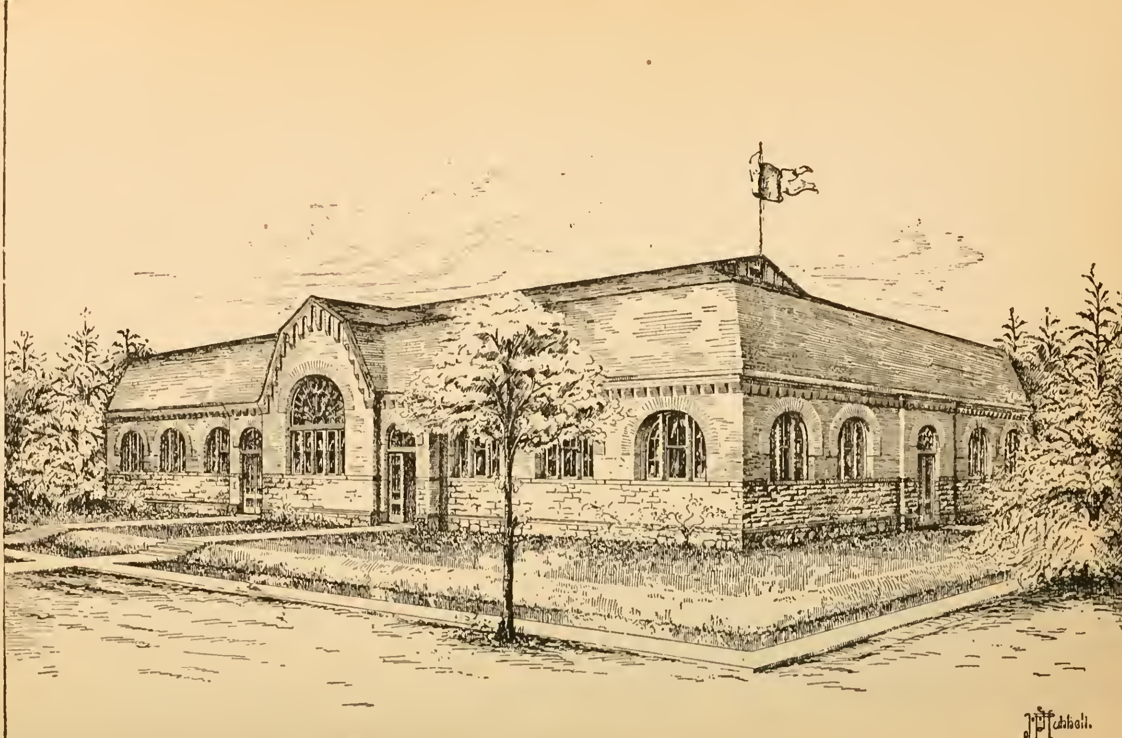
Every male student capable of performing military duty and not excused for sufficient cause, is required to drill twice each week until he has gained six creditable term records. He is also required to study the Drill Regulations for Infantry and to recite upon the same once a week until he passes two creditable term examinations. This practical instruction begins as soon as possible after he enters the University: but a preparatory student, carrying no freshman studies and not expecting to matriculate during the year, is not permitted to drill. The standings in study and drill are placed on record, with other class credits; two terms of recitations and drill count one credit, and the four remaining terms of drill another, and are requisite to graduation in every University course.

Appointments in the battalion are nominated by the professor in charge and confirmed by the Faculty.

Students who have passed two examinations in the drill regulations and who have gained two term credits in drill practice are eligible for corporals; those having three term credits in each are eligible for sergeants; and those having six term credits in each, for lieutenants and for officers of higher rank.

The battalion (four companies) is composed mainly of the members of the freshman and sophomore classes; the first supplying the corporals, the second, the sergeants, while the captains and lieutenants are taken from those of the junior class who have passed through the lower grades satisfactorily.

A special military scholarship, good for one year, is conferred upon each student who attains the grade of a commissioned officer; one-third the value of which is paid the holder at the close of each term.



MILITARY HALL

An artillery detachment is organized mainly from the second year or sophomore class, which receives practical instruction twice each week during the college year.

Towards the close of the spring term, a committee appointed by the Faculty examines candidates for nomination to the governor of the state to receive commissions as brevet captains in the state militia. Candidates must be members of the senior class in full standing at the time of this examination; must have completed the course of military studies; must have served three terms as captains or lieutenants, and must be approved by the Faculty, as having good reputations as scholars, officers, and gentlemen.

Under the authority of the acts of incorporation, the Trustees have prescribed a uniform of cadet gray, with black cloth trimming, cut after the pattern prescribed by the U. S. Army Regulations; members of the band to wear the usual additional trimmings. The uniform of the commissioned officers is that of officers of the same grade in the National Guard. All members of the battalion wear the University badge on the cap. Uniforms must be procured within one month after entering upon military duty, and must be worn at all military formations.

The University Cornet Band is composed of students, and every full term of service therein is counted as one term of drill.

Courses in Military Science.

1. Drill Regulations.—For all male students. School of the soldier; school of the company in close and in extended order; bayonet exercise. *Fall and winter terms, 1 hour a week.* Professor Hills.

2. Drill Practice.—For all male students. *Six terms, 2 hours a week.* Professor Hills.

3. Recitation and Practice for Military Class.—(*a*) School of the battalion, close and extended order; artillery drill.

   (*b*) Ceremonies, review, and inspection; military signaling; sword exercise; artillery drill.

   (*c*) Guard, outpost, and picket duty; military signaling; artillery drill.

   (*d*) Military administration; reports and returns; theory of fire arms; target practice.

   (*e*) Organization of armies; field fortifications; art of war. *Seven terms, recitations, 1 to 2 hours a week; drill, 2 hours a week.* Professor Hills.

MUSIC.

CLARA MAUD KIMBALL.

Music constitutes no part of any University course of studies, and is therefore not provided by the Trustees. But, as many students desire instruction in music, competent teachers are selected by the Trustees, and rooms are set apart for instruction.

TUITION.

Instruction, term of ten weeks—2 lessons a week	$15.00
For term of ten weeks—1 lesson a week	8.00
Practice on piano, one hour daily, per term	2.00

The teacher of Vocal Music and Voice Culture, follows the Italian method, giving individual instruction.

TERMS.

Ten weeks—2 lessons a week	$20.00
Ten weeks—1 lesson a week	12.00

No deduction on account of absence in either course, except in case of protracted illness.

Special students in music will also be charged the regular term fee charged other students of the University.

PRIZES AND SCHOLARSHIPS.

THE CONKLIN ORATORICAL PRIZES.

Mr. R. R. Conklin, an alumnus of the University, has offered two prizes, of $60 and $40, respectively, for original orations from juniors, to be pronounced at such time as the Faculty may appoint during the week of commencement. Competition is open to such as are full members of the junior class. From the orations submitted on or before the 17th day of April, a number, not to exceed ten, to be selected by the Faculty, will be presented on the platform, and to the first and second best, as may be determined by judges, the prizes will be awarded.

[For the year 1891–92 Mr. Conklin made the prizes respectively $90 and $60, and a third prize of $20 was added by a citizen of Champaign, Ill.]

THE HAZLETON PRIZE MEDAL.

Capt. W. C. Hazleton has provided a medal, of beautiful and artistic design, which is to be awarded at a competitive drill to be held near the close of the year, to the best drilled student. Each competitor must have been in attendance at the University for at least sixteen weeks of the current college year; must not have had more than four unexcused absences from drill; and must present himself for competition in full uniform.

The award will be made on the following points:

1. Erectness of carriage, military appearance, and neatness.
2. Execution of the school of the soldier, without arms.
3. Manual of arms, with and without numbers.

The successful competitor will receive a certificate setting forth the facts, and may wear the medal until the 15th day of May following, when it will be returned for the next competition.

HONORARY SCHOLARSHIPS.

Provision has been made for one honorary scholarship for each county in the state. The holder of the scholarship may attend the University for four years, under proper regulations, free of charge for tuition or incidental expenses. The total value of this scholarship is $90.

Several of these scholarships are already occupied. The vacancies in other counties will be filled as follows:

Examinations are to be held in the several counties, under the supervision of the county superintendents thereof, on the second Friday and Saturday of June, at such places as the superintendents may select. Candidates for the examination must be approved by the superintendents in the common English branches. Questions will be furnished from the University, and the answers, in writing, will be sent to the University for judgment. The scholarship will be awarded to the candidate who passes the best examination, provided he has a standing in each subject of not less than 75, and an average standing on all the subjects of not less than 80, per cent.

Each pupil who enters the examination may choose whether he will be examined to enter upon a course in Colleges of Agriculture, Engineering, or Science, or one of the courses in the College of Literature.

In the first case, the subjects of his examination will be algebra, geometry, physiology, botany, natural philosophy, and English rhetoric.

In the second case, the subjects will be algebra, geometry, botany, or natural philosophy, three books of Cæsar, five orations of Cicero, and six books of the Æneid.

The two classes of examinations are intended to be as nearly equivalent as possible, and to conform to the requirements stated under the head, *Examinations for Admission*, p. 143. It is essential that the examinations in the counties be held at the time named above, publicly, and with reasonable notice; requests for special or private examinations can not be considered.

CHICAGO CLUB SCHOLARSHIPS.

The Chicago Club of the University of Illinois offers two scholarships of $250.00 each, payable to the beneficiary, $100.00 the first year, $75.00 the second year, $50.00 the third year, and $25.00 the fourth year. The scholarships are offered to residents of Cook County, Illinois, only, and are to be awarded upon competitive examination to those obtaining the highest average grades. The examination questions are prepared at the University and cover the same subjects as those for the honorary scholarships.

MILITARY SCHOLARSHIPS.

Students who have gained six term credits in class room military instruction and six such credits in drill practice are eligible for appointment as commissioned officers of the battalion. Those attaining this rank are each awarded a special scholarship, good for one year and equal in value to the University term fees for the same length of time.

FELLOWSHIPS.

Four fellowships, each of $400 a year, are offered to members of the Graduate School, in connection with which further particulars in regard to them are given.

SOCIETIES.

The Literary Societies have from the opening of the University enjoyed its fostering care.

The Adelphic, Philomathean, and Academy societies, for men, and the Alethenai, for women, occupy spacious halls, which

the members have furnished and decorated with taste and elegance. Meetings are held Friday evenings throughout the term time, are well attended, and are maintained with unflagging interest. They furnish excellent drill in writing, speaking, and parliamentary methods.

The YOUNG MEN'S and YOUNG WOMEN'S CHRISTIAN ASSOCIATIONS are both active and useful.

Special organizations unite the students of NATURAL HISTORY, of CIVIL ENGINEERING, of MECHANICAL ENGINEERING, of ARCHITECTURE, of AGRICULTURE, and of CHEMISTRY, and in ATHELETICS.

GRADUATE SCHOOL.

Instruction and the facilities of advanced study and research are now offered to the graduates of this and of other colleges and universities without fees or payment of any kind, except for actual laboratory expenses. The diploma of any college or university in good standing is accepted for admission, instead of entrance examinations. No formal courses of study are prescribed, but special arrangements are made to meet as nearly as practicable the wishes of each applicant. Such students do not attend regular recitations or lectures unless they also take some undergraduate work, in which case they conform to the usages of the class attended, and pay the regular fees. They may be requested to give one or more class lectures in the line of their special studies. A second degree is awarded upon the completion of the required studies and the presentation of an accepted thesis. The general requirements for degrees may be found elsewhere under the proper heading.

FELLOWSHIPS.

The University offers four fellowships, open to graduates of this or other similar institutions, conditioned upon required qualifications and a designated amount of service to the University. Each fellowship is good for one year and has a money value of $400.00, payable in ten monthly installments. Appointments to these fellowships are made upon the grounds of good character, high attainments, promise of distinguished success in the line of studies chosen, and of usefulness to the University. The holders of the

fellowships are required to give instruction in assigned subjects (5 to 10 hours a week) to one class each day during the year. The time remaining is to be devoted to graduate study; and, upon the completion of a prescribed course, a second degree is awarded.

UNIVERSITY EXTENSION.

The University offers a series of lecture courses by members of the Faculty upon a considerable number of the subjects taught by them. The work is similar to that which has become so popular in connection with the great English universities during the last few years. It is an extension of University instruction to people at their homes who cannot attend the institution itself as students, but yet desire the information that such students gain. In the endeavor to make the University doubly useful to the people of the state, the professors hold themselves in readiness to lecture upon invitation in any accessible locality, if consistent with regular duties. The subjects and lectures are the same as at the University, so that there is a real extension of its teaching. The course upon a single subject usually consists of six lectures, one given each week and commonly upon Friday or Saturday evening. For each lecture there is distributed a printed syllabus or outline giving also directions to the best literature upon the subject, and other information. The lectures are preceded or followed by reviews, quizzes, and discussions; and at the end of the course an examination may be held. To those satisfactorily passing such examinations a special certificate is issued in the name of the University, and the proper records are made upon its books.

A special series of lectures has been arranged for teachers' summer institutes. These are not intended to take the place of the ordinary instruction given in such institutes, but to present University subjects, by University methods, as far as possible, with all the aids of illustrative and demonstrative equipments.

During the year 1891–92 (beginning in January), the following courses have been given:

Constitutional History.—Professor CRAWFORD. (1) Six lectures, at Pontiac, Ill.; (2) Three lectures, at the University, for citizens of Champaign and Urbana.

Lowest Forms of Life.—Professor FORBES. Three lectures, at the University, for citizens of Champaign and Urbana.

Elocution and Oratory.—Professor BROWNLEE. Two lectures, at La Salle, Ill.

English Language and Literature.—Professor BUTLER. (1) Three lectures, at the University, for citizens of Champaign and Urbana; (2) Six lectures, at Oak Park, Ill.; (3) Six lectures, at Evanston; (4) Six lectures, at the Newberry Library, Chicago; (5) Six lectures, at Freeport, Ill.; (6) Six lectures, at Farmer City, Illinois.

Electricity.—Professor STRATTON. Three lectures, at the University, for citizens of Champaign and Urbana.

Over 800 people have attended these courses and in every case much interest has been awakened. A large amount of collateral reading has been done by members of the several classes. A number of invitations are already in for next winter.

A special circular giving the subjects and lectures for 1892–93, will be sent on application.

REGULATIONS AND ADMINISTRATION.

ADMISSION.

Examinations of candidates for admission to the University, or to any of its departments, are held at the University itself, on the two days previous to the opening of each term.

Applicants must be at least fifteen years of age, and it is considerd desirable that they be three to five years older than this. They must pass the required examinations, and must pay the prescribed fees. No distinction is made in regard to sex, nativity, color, or place of residence. Entrance may be made at any time, provided the candidate is competent to take up the work of the classes then in progress; but it is very much better to begin upon the first collegiate day in September, when a large number of the classes are organized, several of them to continue during the year. Entrance, however, may usually be made satisfactorily at the beginning of the winter and spring terms.

The engineer and architect should be adepts in the various departments of drawing, and some previous study of this branch will

be of great advantage. Faunce's Mechanical Drawing is recommended as a text book, and the drawings should be made on smooth paper, eight by ten inches, then inked properly.

ENTRANCE EXAMINATIONS.

The subjects upon which examinations for admission are held are as enumerated below:

For the Colleges of Agriculture, Engineering, and Science.

Arithemetic; English grammar; geography; history of the United States; algebra, including equations of the second degree and the calculus of radical quantities; geometry, plane and solid; physiology; botany; natural philosophy; rhetoric and composition.

Candidates for admission will be required to write a short essay correct as to punctuation, paragraphing, the use of capitals, etc., and they will be asked to correct English writing faulty in these and other respects. In 1893 longer essays will be required (except from those offering Greek) upon subjects drawn from one or two of the following works: Shakespere's Julius Cæsar, Scott's Marmion, Webster's First Bunker Hill oration, Goldsmith's Deserted Village, Irving's Sketch Book. Or one year's work in French or German will be accepted instead of the English literature described.

The text books mentioned in course of study for the preparatory classes. may be taken as an indication of the requirements in these studies. Any real equivalents for the books named are accepted.

For College of Literature.

For the courses in English Modern Languages, Latin, and Philosophy and Pedagogy, the same as the above, except the Rhetoric and Composition and with the addition of the following Latin:

Three books of Cæsar's Commentaries, five orations of Cicero, six books of Vergil's Æneid, with scansion of hexameter verse and the translation of English sentences into Latin prose, based on the portions of Cæsar and Cicero above named. This will necessitate a thorough knowledge of the etymology and syntax of Latin grammar.

Harkness's or Allen and Greenough's Grammar and Collar's Latin Prose Composition are recommended.

Real equivalents for any of the above mentioned works will be accepted.

The Roman method of pronunciation is used.

For the Classical Courses, the same as the first list, except the omission of rhetoric and composition, physiology, botany, and

natural philosophy, and with the addition of the Latin described and Greek as follows:

Greek Grammar (Goodwin's or Hadley's), Greek Prose Composition (Jones's), and four books of Xenophon's Anabasis, or two books of the Anabasis and Herodotus, Mathew's Selections. Writing Greek with the accents will be required.

The so-called Continental sounds of the vowels and diphthongs and pronunciation according to accent are recommended.

County Superintendents' Certificates.—To prevent loss to those who are not prepared to enter the University, but might come, hoping to pass the examinations for admission, the following arrangement has been made:

County Superintendents of schools will be furnished with questions and instructions for the examination of candidates in the four common branches, arithmetic, geography, English grammar, and history of the United States; applicants who pass creditably will, when they present the superintendent's certificate to that effect, be admitted to the classes of the preliminary year.

Persons who hold teacher's certificates from county superintendents will be admitted to the preliminary class without further examination.

ACCREDITED HIGH SCHOOLS.

The Faculty, after personal examination, appoints accredited high schools, whose graduates may be admitted to the University without further examination within two years after the date of their graduation. These must be schools of first rate character, whose course of instruction include all the studies required for admission to some one of the colleges of the University. On application, a member of the Faculty is sent to examine a school making application, as to its facilities for teaching, its course and methods of instruction, and the general proficiency shown. If the report is favorable, the name of the school is entered in the published list of high schools accredited by the University. The graduates of these schools are admitted to such of the colleges as their studies may have prepared them to enter. The appointment continues as long as the work of the school is found satisfactory. Annual reports are asked from these schools.

The accredited schools whose graduates are admitted to any of the colleges of the University are the public high schools in

SCHOOLS AND PRINCIPALS.

Aurora, East, E. G. Cooley.
Aurora, West, Kittie Reynolds.
Austin, Helen S. Wyllis.
Beardstown, M. Moore.
Belvidere, J. C. Zinser.
Bement, J. M. Martin.
Bloomington, Edward Manley.
Cairo, M. D. Leahy.
Canton, C. M. Bardwell.
Champaign, R. L. Barton.
Charleston, Louise Baumberger.
Chicago, North, O. S. Westcott,
Chicago, South, Jeremiah Slocum.
Chicago, West, Geo. M. Clayberg.
Danville, S. D. Brooks.
Decatur, Lewis B. Lee.
Delavan, Geo. A. Franklin.
Dixon, Martha Minerman.
Elgin, H. F. Derr.
Englewood, James E. Armstrong.
Evanston, H. L. Boltwood.
Farmer City, Geo. S. Mellor.
Freeport, Frances Roseborough.
Galena, Kate McHugh.
Hyde Park, Chas. W. French.
Jacksonville, Virginia Graves.
Jerseyville, J. Pike.
Joliet, S. M. Van Petten.
Kankakee, C. W. Groves.
Kewanee, Horace Phillips.
La Grange, H. W. Thurston.
Lake, E. F. Sterns.
Lake View, James H. Norton.
Lincoln, Jane Kidd.
Maywood, C. W. Minard.
Mattoon, Mary A. Port.
Mendota, West, Wm. Jenkins.
Moline, B. C. Caldwell.
Oak Park, W. E. Goddard.
Ottawa, J. O. Leslie.
Paris, H. B. Hayden.
Peoria, A. W. Beasley.
Princeton, Richard A. Metcalf.
Quincy, W. B. Corbyn.
Rockford, Walter A. Edwards.
Rock Island, J. A. Bishop.
Springfield, Wm. W. Helmle.
Streator, R. Williams,
Taylorville, A. C. Butler.
Tuscola, Elizabeth C. Minor.
Urbana, J. W. Hayes.

Also the high school of the Normal University, at Normal, O. L. Manchester, principal.

The accredited schools whose graduates are admitted to the Colleges of Engineering, of Agriculture, or of Science, are the public high schools in

SCHOOLS AND PRINCIPALS.

Barry, L. H. Chapin.
Belleville, H. J. Klein.
Camp Point, J. W. Creekmur.
Centralia, J. E. Ellis.
DuQuoin, C. J. Harris,
Gibson City, Frances D. Guion.
Greenville, D. W. Lindsey.
Hillsboro, H. M. Anderson.
LaSalle, L. A. Thomas.
Marengo, C. W. Hart.
Monticello, John W. Hughes.
Olney, O. J. Bainum.

Newman, J. L. Hughes.
Onarga, J. R. Freebern.
Peru, Carrie V. Smith.
Polo, I. M. Bridgman.
Rochelle, E. C. Webster.
Shelbyville, F. D. Jordan.
Sterling, A. Bayliss.
Sullivan, B. F. McClelland.
Tolono, J. S. Holady.
Warren, I. C. Baker.
Watseka, Henry Rulison.
Wenona, Ira M. Ong.
Pekin, C. W. Vandegrift.
Pittsfield, Geo. Selby.
Robinson, D. W. Creekmur.
Rossville, H. W. Flanegin.
Sheldon, M. L. Weems.
Sterling (Wallace High School), S. B. Hursh.
Sycamore, A. J. Blanchard.
Washington, F. L. Calkins.
Waverly, H. C. McCarrell.
Yorkville, W. D. Edmunds.

Also the Chicago Manual Training School, H. H. Belfield, principal.

REGISTRATION.

At the beginning of each term each student must present himself in the Regent's office for registration at some time during the two days preceding the formation of classes; and he must be present and be registered at the first exercise of each class he is to attend.

CHOICE OF STUDIES.

Great freedom in the choice of studies is permitted. It is, however, necessarily required that the student shall be thoroughly prepared to enter, and keep pace with, the classes in the chosen studies; and that he shall take these in the terms and at the time of day elsewhere designated. Following the description of each course of instruction will be found the necessary requirements, if any, beyond the general entrance examinations. for admission to that particular course. Careful attention must be given to these requirements and to the special conditions stated in connection with the various courses of study.

The work in military instruction and drill practice is required, as described. of all male students during the freshman sophomore years. Women are excused from this and are allowed to graduate with two credits less than required of men.

The described courses in rhetoric and oratory must be taken by all students at the times and to the extent given in the suggested and prescribed courses of study.

Each student must have three distinct studies, affording three daily class exercises, unless specially permitted by the Faculty to take less or more.

REQUIRED STUDIES.

To secure the diffusion of the sciences relating to the great industries, the state legislature, in 1873, prescribed that each student should be taught some of those sciences.

The Trustees accordingly require that each student shall take, each term, one study, at least, from the following list:

Agricultural Chemistry.
Agricultural Engineering and Architecture.
Analytical Mechanics.
Anatomy and Physiology.
Animal Husbandry.
Architectural Drawing and Designing.
Astronomy.
Botany.
Bridges.
Chemistry.
Dynamics.
Electric Machinery.
Elements of Agriculture.
Elements of Horticulture.
Entomology.
Esthetics of Architecture.
Estimates.
Free Hand Drawing.
Geodesy.
Geology.
Graphic Statics.
Heat Engines.
History of Agriculture.
History of Architecture.
Hydraulic Engines and Wind Wheels.
Hydraulics.
Landscape Gardening.
Logic.
Machine Drawing.
Masonry Construction.
Mathematics.
Mechanism.
Mental Science.
Metallurgy.
Military Science.
Mill Work.
Mine Administration.
Mine Attack.
Mineralogy.
Mining Engineering.
Physics.
Political Economy.
Railroad Engineering.
Resistance of Materials.
Rural Economy.
Sanitary Construction.
Stone, Brick, and Metal Construction.
Surveying.
Vegetable Physiology.
Veterinary Science.
Wood Construction.
Zoölogy.

TERM EXAMINATIONS.

Written examinations are held at the close of each term or oftener, and whenever any study has been completed. Any student failing to answer correctly 60 per cent of the questions proposed, loses all credit for that study, and is precluded from proceeding with any other studies without special permission. If he answers from 60 to 74 per cent of the questions he is conditioned and may have another examination on application to and arrangement with the instructor. 75 per cent is required to pass.

A record is kept of each student's term work and standing, and from this his final certificate of graduation is made up.

A statement of the scholarship of each student will be sent to his parent or guardian as soon as may be after the end of each term.

DEGREES.

The usual bachelors' and masters' degrees are conferred upon those who satisfactorily complete the courses of study described under the different colleges. A candidate for a bachelor's degree must pass in the subjects marked *required* in his chosen course, and must conform to the directions given in connection with that course in regard to electives. In the College of Engineering he must complete the course of study as laid down. In the Colleges of Agriculture and Literature and in the school of natural science 40 term credits, and in the College of Engineering and in the school of chemistry 41 term credits are required for graduation. This includes two credits for military science which are not required of women, who may therefore graduate with two credits less than the number stated. Men, excused for cause from the military requirements, may elect in lieu thereof two extra term's work in any subjects taught in the University.

Credits from other colleges or universities may be accepted by the Faculty for advanced standing; but at least one year's residence at the University and the completion of one year's work is necessary to secure a bachelor's degree.

In all cases an accepted thesis is required for graduation. The subject must be announced not later than the first Monday of the winter term, and the completed thesis must be handed to the dean of the proper College by April 30th. The work should be done under

the direction of the professor in whose department the subject naturally belongs, and should be in the line of the course of study for which a degree is expected. The thesis should be based upon original research, and must contain at least 2.000 words, or an equiva ent in tables, drawings, and illustrations. It must be presented upon regulation paper and will be deposited in the library of the University.

1. The degree of Bachelor of Arts will be given to those who complete a classical course in the College of Literature.

2. The degree of Bachelor of Letters will be given to those who complete one of the other courses in the College of Literature. The name of the course will be inserted after the degree.

3. The degree of Bachelor of Science will be given to those who complete a course of study in the College of Engineering, of Agriculture, or of Science. The name of the course will be inserted after the degree.

4. The master's degrees, M.A., M.L., and M.S., and the equivalent degrees of Civil Engineer and Mechanical Engineer. etc., will be given, after 1894, to graduates of this or other similar institutions who have pursued at this University a year of prescribed graduate studies and have passed examinations thereon, or who have pursued as non-residents three years of such study and have passed the required examinations. Studies for a master's degree must be in the general line of the bachelor's degree already received, and of the degree sought.

In all cases an accepted thesis is required and this should be presented at least one month before the close of the collegiate year. It must be based upon originial research and must show scholarly acquirements of high order.

Graduates of this University who took a first degree before 1892 may obtain a second degree as heretofore, until after 1894.

GENERAL DIRECTIONS TO STUDENTS.

Young men or women desiring a liberal education, and living at a distance from a college or university, are often puzzled to understand precisely what they will be required to know and do in order to gain admission. To such these words are addressed:

1. Notice that a college, or university (which is properly a collection of colleges) is designed for the higher education only, and

not for the study of common branches. None of the common branches, such as arithmetic, geography, English grammar, reading, and spelling, are taught in this University. These all must be finished before you come.

2. In order to pursue profitably the true college studies, and to keep pace with the classes, you must be ready to pass a strict examination in the common branches just mentioned, and in certain other preparatory studies, differing with the different colleges of the University. (See p. 143.)

3. If well prepared in the above named common branches only, you may be admitted, not to a college, but to the preparatory classes, in which you will study the other preparatory studies for admission to college. (See p. 154.) All preparatory studies must be completed before you can be admitted, as a matriculated student, in any college class.

4. You should enter at the beginning of the college year, in September. If unable to enter at that time, you may enter at any later time, if you can profitably take up the work of the classes.

5. Enter college with the purpose of going through, and make your course *regular as far as you go.* If obliged to leave before you have finished the course, you will have done the best thing for yourself in the meantime; while if you remain, the regular course is in nine cases out of ten the most useful and effective.

Students desiring only a winter's schooling should go to some high school.

LABOR.

Labor is furnished as far as possible to all who desire. It is classified into educational and remunerative labor.

Educational labor is designed as a practical instruction, and constitutes a part of the course in several schools. Students are credited with their proficiency in it as in other studies. Nothing is paid for it.

Remunerative labor is prosecuted for its products, and students are paid what their work is worth. The usual rate paid for ordinary farm, garden, and shop labor is *twelve and one-half cents* per hour. Students of sufficient experience may be allowed to work by the piece or job, and thus by diligence or skill secure more pay.

Some students who have the requisite *skill, industry, and economy*, pay their entire expenses by their labor; but, in general,

young men cannot count upon doing this at first, without a capital to begin with, either of skill or money, to serve them till a degree of skill is acquired. As the number of students increases, it is found more and more difficult to furnish the labor needed, and students cannot count upon finding employment.

BOARD.

The University does not furnish board. There is no general provision for boarding, but there is an abundance of suitable private places in Urbana and Champaign within a reasonable distance of the University, and easily accessible by electric railways, where students can obtain either table board or board and rooms, with the advantages of the family circle. Boarding clubs are formed, at which the cost of meals is about two and a half dollars per week. Some students prepare their own meals, thus considerably reducing expenses.

The Business Agent and the Young Men's and Young Women's Christian Associations of the University will aid new students in procuring rooms and boarding places.

EXPENSES.

THE TUITION IS FREE in all the University classes.

THE MATRICULATION FEE entitles the student to membership in the University until he completes his studies, and must be paid before he enters.

Amount..$10 00

THE TERM FEE for incidental expenses is for each student.... 7 50

Each student working in laboratories, or in the draughting or engineering classes, is required to make a deposit varying from 50 cents to $10, to pay for chemicals and apparatus used, and for any breakages or damages.

ALL BILLS due the University *must be paid before the student can enter classes.*

The following are estimated maximum and minimum annual expenses, exclusive of books and clothing, of a residence of thirty-six weeks at the University:

Term fees..................................	$ 22 50	$ 22 50
Room rent for each student..................	18 00	48 00

Table board in boarding houses and clubs	$ 90 00	$ 126 00
Fuel and light	10 00	15 00
Washing at 60 cents per dozen	9 00	18 00
Total amount	$149 50	$229 50
Board and room in private houses, per week	4 00	6 00

Fees in the Preliminary Year, or the Farmers' Junior Course.

Tuition, per term	$ 5 00
Incidental fee, per term	7 50

Special Fees.

For Instrumental Music, for 20 lessons	$15 00
For Painting, or Drawing, to special students	10 00
Matriculation fee	10 00
Fees for diplomas	5 00

Caution to Parents—Students' Funds.

The Business Agent will receive on deposit any funds parents may intrust to him to meet the expenses of their sons. *No greater error can be committed than to send boys from home with large amounts of spending money*, without the authoritative care of some prudent friend. Half the dissipation in colleges springs from excessive allowances of money. Students have little real need for money, beyond that required for fees, board bills, and books. The attention of parents and guardians is earnestly requested to this matter, and especially in the case of those students who are under 20 years of age.

PREPARATORY CLASSES.

To meet an urgent demand, the Trustees have temporarily provided for teaching the preparatory studies lying between the work of the elementary schools and the University. Candidates for these classes must not be less than fifteen years old. They must pass satisfactory examination in arithmetic, geography, English grammar, and history of the United States.

Students in the preparatory studies are not matriculated as members of the University. They pay no entrance fee, but are

charged a tuition fee of five dollars a term, and an incidental fee of seven and a half dollars a term. They have all the privileges of the library, and of public lectures.

The studies taught in the preliminary year as follows:

For Colleges of Agriculture, Engineering, and Science.

First Term.—Algebra—(Wells's). Fundamental rules; factoring; common divisors and multiples; powers and roots; calculus of radicals; simple equations; proportion and progression. Physiology—(Cutter's). Natural Philosophy—(Norton's).

Second Term.—Algebra—Quadratic equations, etc. Geometry—Wells's) Plane geometry, lines, circumferences, angles. polygons, as far as equality. English—Elements of composition. (Clark's.) Orthoëpy and word analysis. (Introduction to Webster's Academic Dictionary.)

Third Term.—Geometry completed, including solid geometry and the sphere. English, as in the second term, with addition of Goldsmith's Deserted Village, Shakespere's Julius Cæsar, Scott's Marmion, Webster's first Bunker Hill oration, and Irving's Sketch Book, read with care. Botany—Gray's Lessons and Manual.

For Courses in the College of Literature, Except the Classical Course.

First Term.—Algebra as above. Physiology. Natural Philosophy. Latin—Cicero's Orations. Prose composition.

Second Term.—Algebra and Geometry, as above. Latin—Æneid. Prose composition.

Third Term. — Geometry, as above. Botany. Latin—Æneid. Prose composition.

For Classical Course.

First Term. — Algebra, as above. Latin — Cicero's Orations. Prose composition. Greek—Grammar (Goodwin) and Reader (Moss). Prose composition.

Second Term.—Algebra and Geometry, as above given. Latin—Æneid. Prose composition, Greek—Continuation of first term. Prose composition.

Third Term.—Geometry completed. Latin—Æneid. Prose composition. Greek—Anabasis (Kelsey). Prose Composition (Woodruff).

LIST OF STUDENTS.

RESIDENT GRADUATES.

Bouton, Charles Sherman,	Hyde Park.
Bowsher, Columbus Austin,	Champaign.
Hobbs, Glen Moody,	Yorkville.
Jones, Isabel Eliza,	Champaign.
McClure, George W., B.S.,	Champaign.
Myers, George Washington, M.L.,	Urbana.
Paine, Sarah Mariena,	Orizaba.
Shattuck, Anna Fletcher, B.L.,	Champaign.

SENIOR CLASS.

Barber, William Davis,	*Champaign,*	Civil Engineering.
Barker, John King,	*Three Rivers, Mass.*	Civil Eng.
Beckwith, Frank,	*Quincy,*	Civil Engineering.
Burrows, Parke Tunis,	*Davenport, Iowa,*	Arch. and Mil.
Carnahan, Franklin Gregory,	*Champaign,*	Classical.
Crissey, John Waterbury,	*Chester,*	Civil Engineering.
Cross, Charles William,	*Kewaunee,*	Architecture.
Forbes, Robert Humphrey,	*Princeton,*	Chemistry.
Foster, Winslow Howard,	*Chicago,*	Mech. Engineering.
Foster, Zebulon,	*Armstrong,*	Civil Engineering.
Funston, Edmund Bailey,	*Champaign,*	Architecture.
Gates, Andrew Wallace,	*Earlville,*	Civil Engineering.
Gulick, Edward Everett,	*Champaign.*	Eng. and Mod. Lang.
Gulick, Joseph Piper,	*Champaign.*	Eng. and Mod. Lang.
Gunn, Charles Alexander,	*Evanston,*	Architecture.
Hall, Fred Augustus,	*Tonica,*	Chemistry.
Hart, Ralph Warner,	*Harvey,*	Architecture.
Harvey, Walter Clarence,	*Paris,*	Architecture.
Herrick, Lott Russell,	*Farmer City.*	Eng. and Mod. Lang.
Kiler, Charles Albert,	*Urbana.*	Natural Science.
Klingelhoefer, William,	*Mascoutah,*	Civil Engineering.
McLane, Cyrus Daniel,	*Allerton, Iowa.*	Architecture.

Martin, William Alexander,	*Chicago*,	Mechanical Engineering.
Mather, Roy Allen,	*Naperville*,	Civil Eng. and Mil.
Miller, William George,	*Chicago*,	Mech. Eng. and Mil.
Morgan, John Barb, Jr.,	*Kinmundy*,	Eng. and Mod. Lang.
Mosier, Jeremiah George,	*Urbana*,	Natural Science.
Page, John William,	*Waukegan*,	Civil Engineering.
Peterson, Adolph Bertinus,	*Chicago*,	Architecture.
Phillips, James David,	*Englewood*,	Architecture.
Piatt, Herman S,	*Champaign*,	Classical.
Plank, Ulysses Samuel Grant,	*East Lynne, Mo.*,	Natural Science.
Pullen, Rome B,	*Centralia*,	Eng. and Mod. Lang.
Scheidenhelm, Edward Louis,	*Mendota*,	Civil Eng. and Mil.
Snodgrass, William, Jr.,	*Urbana*,	Mech. Engineering.
Swenson, Bernard Victor,	*Chicago*,	Mech. Engineering.
Wait, Benjamin Asaph, Jr.,	*Armstrong*,	Civil Engineering.
Walker, Edward Lewis,	*Petersburg*,	Eng. and Mod. Lang.
Williamson, Frank Robert,	*St. Anne*,	Civil Engineering.
Woodworth, Howard Oakley,	*Champaign*,	Natural Science.
Wright, Royal,	*Urbana*,	Eng. and Mod. Lang.
Barber, Alice May,	*La Fox*,	Natural Science.
Bennett, Sarah,	*Mattoon*,	Eng. and Mod. Lang.
Boggs, Cassandra Armstrong,	*Urbana*,	Eng. and Mod. Lang.
Hill, Agnes Gale,	*Nevada, Mo.*,	Classical.
Maxwell, Anne Melissa,	*Champaign*,	Eng. and Mod. Lang.

JUNIOR CLASS.

Aranda, Ezequiel,	*Allende, Mex.*,	Mechanical Eng.
Bacon, Harlow,	*Huntsville*,	Civil Eng. and Mil.
Barrett, Edward Ernest,	*Port Byron*,	Civil Engineering.
Bartlett, Henry Emmett,	*Mt. Sterling*,	Civil Engineering.
Behrensmeyer, George Philip,	*Quincy*,	Architecture.
Blakesley, George Webster,	*Rock Island*,	Electrical Eng.
Brown, Frank Manear,	*Champaign*,	Architecture.
Butler, William Tennent,	*Franklin, Ohio*,	Civil Engineering.
Carter, Charles Willard,	*Aledo*,	Eng. and Mod. Lang.
Chambers, William Rock,	*Sadorus*,	Eng. and Mod. Lang.
Coffeen, Fred Goldsmith,	*Champaign*,	Chemistry.
Cornell, William Henry,	*Grant Park*,	Mech. Eng. and Mil.
Craig, Edward Chilton,	*Mattoon*,	Eng. and Mod. Lang.
Danley, Willis Wilson,	*Hennepin*,	Civil Engineering.

Davis, Jonathan Sydney,	*Atwater,*	Arch. and Mil.
Dunaway, W. Alfred,	*Ottawa,*	Architecture.
Earl, Mark Alden,	*Centralia,*	Civil Eng. and Mil.
Gibbs, William David,	*Winchester.*	Agriculture.
Graham, William Johnson,	*Aledo,*	Eng. and Mod. L. and Mil.
Hicks, Preston T.,	*Warren,*	Civil Engineering.
Higgins, Albert Grant,	*Elmwood,*	Architecture.
Hucke, Philip Matthias,	*Mascoutah,*	Natural Science.
Levy, Alexander,	*Brookfield, Mo.,*	Architecture.
Lockwood, Frank Miner,	*Champaign.*	Architecture.
Loomis, Arthur Bates,	*Fulton,*	Civil Engineering.
McCloy, Robert Emmett,	*Welton,*	Eng. and Mod. Lang.
McClure, Clyde Benjamin,	*Gibson City,*	Civil Engineering.
McGee, Walter Scott,	*Deers,*	Pedagogy.
McMains, Louis,	*Armstrong,*	Natural Science.
Merrifield, Albert Warren,	*Ottawa,*	Civil Engineering.
Powers, Will Ambrose,	*Belvidere.*	Chemistry.
Rea, Alfred Willemin,	*Urbana.*	Architecture.
Rowe, William Briggs,	*Ottawa.*	Classical.
Russell, Charles Wesley,	*Virginia.*	Classical.
Scott, Donald Gamaliel,	*Champaign,*	Architecture.
Seaman, George Washington,	*Beardstown.*	Elec. and Mech. Eng.
Shiga, Shigetsura,	*Tokio, Japan,*	Architecture.
Skielvig, Severin Canute,	*Chicago,*	Architecture.
Somers, Bert Sheldon,	*San Diego, Cal.,*	Architecture.
Spalding, Fred Milton,	*Gibson City.*	Civil Eng. and Mil.
Steele, James,	*Henry,*	Chemistry.
Steinwedell, William Ernest,	*Quincy,*	Electrical Engineering.
Swenson, Bernard Victor,	*Chicago,*	Elect. and Mech. Eng.
Thielbar, Frederick John,	*Peoria,*	Architecture.
Thompson, Almon Daniel,	*Gilman,*	Civil Engineering.
Toerring, Christian Jensen,	*Davenport, Iowa,*	Mech. Eng.
Vial, Robert Clarke,	*Western Springs,*	Civil Engineering.
Wilder, Charles Thornton,	*Champaign.*	Natural Science.
Woodruff, Thomas Tyson,	*Quincy.*	Elect. and Mech. Eng.
Young, Orres Ephraim,	*Stonington.*	Eng. and Mod. Lang.
Ayers, Grace,	*Urbana,*	Eng. and Mod. Lang.
Johnson, Harriette Augusta,	*Rock Island,*	Eng. and Mod. Lang.
Lamkin, Nina Belle,	*Champaign,*	Eng. and Mod. Lang.
McCormick, Flora,	*Mahomet,*	Eng. and Mod. Lang.

Mann, Estelle,	*Geneva,*	Eng. and Mod. Lang.
Peterson, Sophia May,	*Champaign.*	Eng. and Mod. Lang.
Philbrick, Margaret,	*Champaign,*	Natural Science.

SOPHOMORE CLASS.

Andrews, Herbert Franklin,	*Piasa,*	Natural Science.
Arbeiter, George J.,	*Plainfield,*	Eng. and Mod. Lang.
Arms, Franklin David,	*Chicago,*	Architecture.
Armstrong, James William,	*Toulon,*	Mechanical Engineering.
Arnold, Benjamin A.,	*Haldane.*	———
Atwood, Levi Patten,	*Rockford,*	Civil Engineering.
Babcock, Clyde Leslie,	*Harvard, Neb.,*	Civil Engineering.
Barker, Louis Gilbert,	*Three Rivers, Mass.,*	Mech. Eng.
Barker, Louis William,	*Sparta,*	Electrical Engineering.
Bauman, Otto,	*Quincy,*	Mechanical Engineering.
Beasley, Harrison Easton,	*Peoria,*	Civil Engineering.
Bevis, Albon,	*Virginia,*	Architecture.
Bond, Joseph Edward,	*Tolono,*	Mechanical Engineering.
Braucher, Herbert Hill,	*Lincoln,*	Agriculture.
Brownell, Charles Dean,	*Champaign,*	Chemistry and Mil.
Burt, Henry Jackson,	*Urbana,*	Civil Engineering.
Bush, Arthur Willis,	*Joliet,*	Architecture.
Butterfield, Clarence James,	*Chicago,*	Architecture.
Carpenter, Harvey Irving,	*Champaign,*	Eng. and Mod. Lang.
Carr, Robert Franklin, Jr.,	*Argenta,*	Chemistry.
Chester, Charles Ellsworth,	*Champaign,*	Civil Engineering.
Chester, Oscar Paul,	*Champaign,*	Natural Science.
Chipman, Paul,	*Mt. Carmel,*	Civil Engineering.
Coffman, Birch David,	*Champaign,*	Natural Science.
Cole, Edward Smith,	*Chicago,*	Mechanical Engineering.
Cook, James W.,	*Rock Island,*	Mechanical Eng.
Cornell, Frank Howe,	*Yorkville,*	Natural Science.
Crawford, Thomas,	*Sterling,*	Electrical Engineering.
Dewey, George French,	*Cairo,*	Civil Engineering.
Dickinson, Richard Joy,	*Eureka,*	Civil Engineering.
Earl, Edward Curtis,	*Centralia,*	Architecture.
Engberg, Martin Jonas,	*Chicago,*	Chemistry.
Foote, Ferdinand John,	*McComb City, Miss.,*	Mech. Eng.
Foster, Alfred Bradford,	*Urbana,*	Civil Engineering.
Fraser, Wilber John,	*Plainfield,*	Agriculture.

Frederickson, George,	*Champaign,*	Eng. and Mod. Lang.
Funston, Jesse Grant,	*Champaign,*	Mechanical Eng.
Gaffin, William Ward,	*Leaf River,*	Civil Engineering.
Gaut, Robert Eugene,	*Mt. Sterling,*	Civil Engineering.
Goldschmidt, Ot o Emil,	*Davenport, Iowa,*	Mech. Eng.
Graham, Louis Thomas,	*Pittsfield,*	Natural Science.
Greene, Herbert Miller,	*Peoria,*	Architecture.
Gulick, Frank M.,	*Champaign,*	Natural Science.
Gumbiner, Charles,	*Peoria,*	Civil Engineering.
Heaton, Edward J.,	*Emden,*	Civil Engineering.
Heideman, George Herman,	*Elmhurst,*	Mech. Engineering.
Hoblit, John Alexander, Jr.,	*Atlanta,*	Eng. and Mod. Lang.
Holston, Benjamin Baldwin,	*Nashville,*	Natural Science.
Huff, George A., Jr.,	*Englewood,*	Chemistry.
Hughes, Samuel Kelso,	*West Unity, O.,*	Latin.
Hunt, Edward Everett,	*Urbana,*	Chemistry.
Jansen, Dietrich Herman,	*Pekin,*	Civil Engineering.
Jasper, Thomas,	*Quincy,*	Mechanical Engineering.
Johannsen, Albert,	*State Center, Iowa,*	Architecture.
Johannsen, Oskar August,	*State Center, Iowa,*	Architecture.
Johnston, Elmer Alward,	*Dewey,*	Mechanical Engineering.
Kerns, Shirley Kendrick,	*Champaign,*	Chemistry.
King, Frank,	*White Hall.*	———
Kinkead, James Albert,	*Earlville,*	Chemistry.
Klingel, Louis,	*Mascoutah,*	Eng. and Mod. Lang.
Locke, Alfred,	*LaSalle,*	Mechanical Eng.
Lockhart, John William,	*Owensville, Ind.,*	Mechanical Eng.
Lowry, James Percival,	*Gibson City,*	Architecture.
Lowry, John Albert,	*Gibson City,*	Civil Engineering.
McCartney, William Priestly,	*Metropolis,*	Chemistry.
McGee, Walter Scott,	*Deers,*	Natural Science.
Mann, Jacob Grant,	*Mascoutah,*	Civil Engineering.
Metcalf, James David,	*Girard,*	Chemistry.
Millar, Clendon Van Meter,	*Mattoon,*	Chemistry.
Miller, Grant Clark,	*Mt. Vernon, Iowa,*	Architecture.
Mogensen, Peter,	*Cope hagen, Denmark,*	Civil Eng.
Morris, Edgar William,	*Onarga,*	Eng. and Mod. Lang.
Morrissey, Daniel C,	*Champaign,*	Eng. and Mod. Lang.
Needham, James,	*Collinsville,*	Mining Engineering.
Phelps, Albert Charles,	*Lockport,*	Architecture.
Riley, Walter Busey,	*Champaign,*	Eng. and Mod. Lang.

Royer, Joseph William.	*Urbana*,	Architecture.
Rutledge, John Joseph,	*Alton*,	Mining Engineering.
Seastone, Charles Victor.	*New Boston*,	Civil Engineering.
Sharpe, Richard W.,	*Tiskilwa*,	Natural Science.
Smith, Harry Keys,	*Quincy*,	Mechanical Engineering.
Smith, Riley Ellis,	*Blue Mound*,	Mechanical Eng.
Stewart, John Truesdale,	*Onarga*,	Civ. Eng. and Mil.
Strauss, William,	*Pittsfield*,	Chemistry.
Strout, Frank Asbury,	*Elwood*,	Mechanical Engineering.
Sy, Albert Philip,	*Altamont*,	Chemistry.
Tackett, William C.,	*Sadorus*,	Natural Science.
Taft, Frank Harvey,	*Champaign*,	Mechanical Eng.
Templeton, Benjamin Franklin,	*Palestine*,	Classical.
Tower, Willis Eugene,	*Chana*,	Chemistry.
Townsend, William,	*Champaign*,	Civil Engineering.
Weedman, Frederick John,	*Farmer City*,	Eng. and Mod. Lang.
Walton, Thomas Percival,	*Paxton*,	Civil Engineering.
Arnold, Mary Edna,	*Souders*,	Classical.
Coddington. Hester.	*Champaign*,	Eng. and Mod. Lang.
Mathews, Loueva May,	*Urbana*,	Eng. and Mod. Lang.
Naughton, Katheryn Louise,	*Champaign*,	Eng. and Mod. Lang.
Nichols, Maude E.,	*Urbana*,	Chemistry.
Shawhan, Gertrude,	*Urbana*,	Eng. and Mod. Lang.
Wingard, Anna Laura.	*Champaign*,	Eng. and Mod. Lang.
Woolsey. Ola C,	*Polo*,	Eng. and Mod. Lang.

FRESHMAN CLASS.

Arms, Herbert Clarke,	*Chicago*,	Architecture.
Armstrong, John Adams,	*Kewanee*.	Mech. Engineering.
Ashley, Richard Jason,	*Tonica*,	Mech. Engineering.
Atherton, George Henry,	*Streator*.	Civil Engineering.
Atkinson, John Thomas,	*Wilmington*.	Mech. Engineering.
Ayers, Clarence Otto.	*Nashville*.	Natural Science.
Barry, Charles,	*Henry*.	Mech. Engineering.
Bassett, John Benjamin,	*Kewanee*,	Architecture.
Baum, Harry William,	*Indianola*,	Civil Engineering.
Beebe, Fred Albert,	*Wisner, Neb*.	Mech. Engineering.
Bennett, Charles Gerrish,	*Mattoon*.	Classical.
Benson, Oliver, Newkirk,	*Champaign*.	Architecture.
Bing, Edward W,	*Urbana*,	Chemistry.

Bissell, Frank,	*Farmer City*,	Eng. and Mod. Lang.
Boggs, Fortune Stanley,	*Urbana*,	Mech. Engineering.
Boon, William Guthrie,	*Armstrong*,	Civil Engineering.
Bower, Loring Alphonso,	*Oreana*,	Mech. Engineering.
Boyle, Hugh G.,	*Hamlet*,	Eng. and Mod. Lang.
Brode, Arthur Willis,	*Buda*,	Mechanical Engineering.
Brown, Fred Gage,	*Urbana*,	Architecture.
Browning, Howard Allen,	*Elgin*,	Architecture.
Burdick, Charles Baker,	*Sterling*,	Civil Engineering.
Burdsal, Charles Southerd,	*Evanston*,	Mining Eng.
Burrill, William Thomas,	*Shelby, Neb.*,	Architecture.
Busey, Frank Lyman,	*Urbana*,	Mechanical Engineering.
Capps, Earl Vanhise,	*Mt. Pulaski*,	Electrical Eng.
Carberry, Ray Shepard,	*Mansfield*,	Civil Engineering.
Carmack, Clyde Robert,	*Camargo*,	Mech. Engineering.
Carnahan, David Hobart,	*Champaign*,	Eng. and Mod. Lang.
Carpenter, Frank Albert,	*Rockford*,	Architecture.
Chester, Henry Ezra,	*Champaign*,	Chemistry.
Clark, Amos Cable,	*Urbana*,	Architecture.
Clark, Cyril Balfour,	*Champaign*,	Mech. Engineering.
Clinton, John Dewitt,	*Polo*,	————————
Cooper, Albert Riley,	*Pesotum*,	Mech. Engineering.
Coultas, Alvin Foster,	*Virden*,	Architecture.
Cowles, Roy Merrick,	*Englewood*,	Mech. Engineering.
Crawford, Charles Francis,	*Chicago*,	Civil Engineering.
Crawford, John,	*Jonesboro*,	Mech. Engineering.
Cutter, Scott Clay,	*Oswego*,	Electrical Engineering.
Decius, Lyle,	*Toledo*,	Eng. and Mod. Lang.
Doxey, Samuel,	*Ogden City, Utah*,	Architecture.
Eakle, Silas Jackson,	*Forreston*,	Natural Science.
Elder, Charles Abbott,	*Topeka, Kansas*,	Architecture.
Emmons, Henry Jeffers,	*Atkinson*,	Civil Engineering.
Farrar, George Arthur,	*Quincy*,	Architecture.
Fay, Frank Earle,	*Marengo*,	Civil Engineering.
Fellheimer, Alfred,	*Chicago*,	Architecture.
Fletcher, Marcus Samuel,	*Ridge Farm*,	Natural Science.
Frye, Theodore Christian,	*Congerville*,	Natural Science.
Fulton, George Thomas,	*Waterman*,	Civil Engineering.
Gamble, Samuel Welsey,	*Chicago*,	Architecture.
Gould, George D.,	*Mattoon*,	Mech. Engineering.
Grattan, William Taylor,	*Galatia*,	Natural Science.

Green, James Albert,	*Ivesdale,*	Mech. Engineering.
Guthrie, Fred Ashford,	*Aledo.*	Chemistry.
Hall, Emery Stanford,	*East Lynn.*	Architecture.
Hall, Lyman,	*Savoy,*	Chemistry.
Hamilton, Frank Henry,	*Springfield,*	Civil Engineering.
Hamilton, Vernor Edward,	*Gardner,*	Architecture.
Hammett, John Burnham,	*Camargo,*	Agriculture.
Harms, Armin,	*Rock Island,*	Chemistry.
Harris, Newton Megrue,	*Champaign,*	Eng. and Mod. Lang.
Harvey, Guy Charles,	*Tolono,*	Chemistry.
Heaton, Thomas Reid,	*Emden,*	Mech. Engineering.
Herdman, Herbert Orville,	*Taylorville,*	Natural Science.
Hiles, Elmer Kirkpatrick,	*Chicago,*	Mech. Engineering.
Hobbs, Reuben Merrill,	*Yorkville.*	Chemistry.
Holbrook, Fred Samuel,	*Englewood.*	Chemistry.
Holtzman, Stephen Ford,	*Pontiac.*	Civil Engineering.
Hoyt, William Judson,	*Chicago,*	Electrical Engineering.
Hunt, Ernest Alexander,	*Urbana,*	Electrical Engineering.
Jameson, Stuart Wells,	*Farmer City,*	Classical.
Johnson, Herbert Lewis,	*Elgin,*	Architecture.
Johnson, John Cummins,	*Lacon,*	Mech. Engineering.
Johnson, Lewis William,	*Champaign.*	Chemistry.
Junkersfeld, Peter,	*Sadorus,*	Electrical Engineering.
Kennard, Perry Garst,	*Champaign,*	Civil Engineering.
Kennedy, John William,	*Collinsville,*	Architecture.
Kerchner, Fred William,	*Belleville,*	Chemistry.
Ketchum, Milo Smith,	*Elmwood,*	Civil Engineering.
Kilgour, Cassius Mathers,	*Sterling,*	Mech. Engineering.
Killam, Francis Grimes,	*Comer,*	Mech. Engineering.
Kimball, Conrad Bryant,	*Champaign,*	Architecture.
Kimball, William Haven.	*Chicago,*	Mech. Engineering.
Klingelhoefer, Charles Benjamin,	*Mascoutah,*	Civil Engineering.
Lackey, Robert Allen	*Oak Park,*	————————
Lake, Edward John,	*Viroqua, Wis.,*	Architecture.
Larrimore, Charles Wesley,	*Jacksonville,*	Elec. Engineering.
Lee, Robert, Jr.,	*Cable,*	Mining Engineering.
Lewellyn, David Rossiter,	*Sterling,*	Mech. Engineering.
Long, Albert Milton,	*Virden,*	Architecture.
Lyons, Timothy John.	*Sadorus,*	Mech. Engineering.
McCaskrin, George Washington,	*Rantoul,*	Chemistry.
McCaskrin, Harry Madison,	*Rantoul,*	Natural Science.

McClintock, Alexander Wiley,	*Urbana.*	Natural Science.
McDonnell, Ernest,	*Table Rock, Colo.,*	Architecture.
McElfresh, Fred Morgan.	*Jacksonville.*	Natural Science.
McLane. John Wallace.	*Allerton, Iowa.*	Chemistry.
McMains. Harrison,	*Armstrong,*	Civil Engineering.
McNutt, John, Jr.,	*Humbolt,*	Eng. and Mod. Lang.
McRae. John Alexander,	*Kewanee.*	————————
Mann, Edward Loring,	*Gilman.*	Eng. and Mod. Lang,
Mather, Fred Elbert,	*Naperville,*	Architecture.
Mathews, John Lathrop,	*Evanston,*	Classical.
Maxon, Robbins Yale,	*Danville,*	Civil Engineering.
Maxwell, Charles Jacob,	*Champaign.*	Chemistry.
Merrick, Harry Austin,	*Chicago.*	Architecture.
Miltimore. Guy,	*Janesville, Wis.,*	Civil Eng.
Morrison, Charles Hugh,	*Odin,*	Eng. and Mod. Lang.
Morrison, William Robert,	*Joliet.*	Architecture.
Morse. Jedidiah D.,	*Champaign.*	Elec. Engineering.
Mueller. Oscar,	*Decatur,*	Mech. Engineering.
Munn, Alexander Majors,	*Swift, Neb.,*	Civil Engineering.
Neal, John Dodge,	*Rantoul,*	Chemistry.
Needham. Frank Mix,	*Hinsdale,*	Natural Science.
Noble, William,	*Champaign,*	Classical.
Orr, Edward Ellsworth,	*Quincy,*	Architecture.
Quade, John Conrad,	*Moline,*	Civil Eng. and Mil.
Randall, Parke Benjamin,	*Aurora.*	Civil Engineering.
Reed. James Horatio,	*Evanston.*	Electrical Engineering.
Reely, Thomas W.	*Spring Green, Wis.,*	Architecture.
Reeves, Harley Edson,	*Tampico,*	Civil Engineering.
Roberts, Francis Eugene,	*Chicago,*	Civil Fngineering.
Roby, Luther Edward,	*Decatur*	Civil Engineering.
Root, George Hinchliff,	*Chicago,*	Mechanical Engineering.
Roysdon, William Ira,	*Champaign,*	————————
Sanders, Ralston Harvey,	*Chicago,*	Mechanical Engineering.
Sayers, Albert Jefferson,	*Champaign.*	Mech. Engineering.
Schwarz, Charles Edward,	*Edwardsville.*	Min. Engineering.
Scott, Lawson,	*Polo,*	Eng. and Mod. Lang.
Scurlock, Henry Harrison,	*Jackson, Ohio,*	Natural Science.
Seyffert, Felipe V.,	*Chihuahua, Mex.,*	Civil Eng.
Shepardson, John Eaton,	*Aurora,*	Civil Engineering.
Slater, William Frederick,	*Urbana,*	Mechanical Engineering.
Snider, Harry Holderman,	*Rantoul,*	Mechanical Engineering.

Snow, Lester J.,	*Maple Park,*	Mech. Engineering.
Stocker, Edwin Warren,	*Rock Island,*	Architecture.
Stoltey, Benjamin Franklin,	*Champaign,*	Architecture.
Stone, Frank Lemuel,	*Port Byron,*	Civil Engineering.
Stowell, Hanson Abbott,	*Anona, Fla.,*	English.
Strehlow, Oscar Emil,	*Champaign,*	Civil Engineering.
Stuart, Will Taylor,	*Cairo,*	Mechanical Engineering.
Tarble, Myron Joy,	*Aurora,*	Civil Engineering.
Teeple, Wallace, Douglas,	*Marengo,*	Architecture.
Thomas, Homer,	*Kickapoo,*	Architecture.
Trego, Charles Henry,	*Hoopeston,*	Elect. Engineering.
Vance, Walter Noble,	*Bement,*	Electrical Engineering.
Warfield, Charles W.,	*Princeton,*	Electrical Engineering.
Weaver, Leslie Alvord,	*Danville,*	Classical.
Webster, Charles Carlton,	*Polo,*	Mechanical Engineering.
Widner, Frederick William,	*Ottawa.*	————————
Wilkinson, Arthur Lewis,	*Argenta,*	Natural Science.
Williams, Parker Merrill,	*Moline,*	Electrical Engineering.
Williams, Scott,	*Bloomington,*	Mech. Engineering.
Wiswall, Thomas,	*Alexander,*	Civil Engineering.
Yeakel, William Krebel,	*Polo,*	Natural Science.
Barnes, Jessie,	*Champaign,*	Natural Science.
Beidler, Gertrude Lou,	*Champaign,*	Eng. and Mod. Lang.
Boggs, Arclissa Florence,	*Urbana,*	Natural Science.
Boggs, Pearl,	*Urbana,*	Classical.
Borden, Susan May,	*Champaign,*	Eng. and Mod. Lang.
Burton, Dora Francelia,	*Mahomet,*	Eng. and Mod. Lang.
Call, Hortense,	*Urbana,*	Chemistry.
Cole, Mary Maude,	*Rantoul,*	Eng. and Mod. Lang.
Crum, Ellen Petefish,	*Farmer City,*	Classical.
Fleming, Edith Anna Belle,	*Champaign,*	Eng. and Mod. Lang.
Forbes, Bertha,	*Champaign,*	Eng. and Mod. Lang.
Green, Marianna,	*Champaign,*	Eng. and Mod. Lang.
Hopper, Georgia Etherton,	*Lockport,*	Natural Science.
McCaskrin, Louise Elizabeth,	*Rantoul,*	Natural Science.
McCullough, Jessie Olive,	*Urbana,*	Eng. and Mod. Lang.
McFadden, Alice Alberta,	*Champaign,*	Natural Science.
Moore, Grace Lillian,	*Tolono,*	Natural Science.
Nye, Ruth Hood,	*Mt. Sterling,*	Eng. and Mod. Lang.
O'Brien, Marguerite Helen,	*Champaign,*	Chemistry.
Parker, Nettie Florence,	*Champaign,*	Natural Science.

Pillsbury, Bertha Marion,	*Urbana*,	Classical.
Scott, Daisy Coffin,	*Champaign*,	Eng. and Mod. Lang.
Shepardson, Mary Frances,	*Aurora*,	Natural Science.
Spencer, Bertha.	*Decatur*,	Natural Science.
Stewart, Mabel,	*Champaign*,	Chemistry.
Thompson, Marion,	*Bement*,	Latin.
Wilder, Elizabeth Cutler,	*Champaign*,	Eng. and Mod. Lang.

PREPARATORY CLASS.

Acton, William M.,	*Higginsville*.	———
Allison, Waite Fisher,	*Mt. Carroll*,	Electrical Eng.
Arends, Homer Albertus,	*Urbana*,	Eng. and Mod. Lang.
Armstrong, John Walter,	*Champaign*.	———
Ash, Joseph,	*Atlanta*,	Eng. and Mod. Lang.
Bailey, Leonard Lionel,	*Chicago*,	Architecture.
Ball, Elmer Newton,	*Mitchellville, Iowa*.	———
Barr, Andrew, Jr.,	*Urbana*,	Architecture,
Barr, Richard James,	*Wilton Center*,	Eng. & Mod. Lang,
Beasley, Abel Harwood,	*Champaign*.	———
Bell, James Arthur,	*Channahon*,	Mechanical Eng.
Bigham, John Ross,	*Chatsworth*.	———
Bishop, James F.,	*LeRoy*.	———
Boal, Edward Tracy,	*Buda*,	Eng. and Mod. Lang.
Bower, Allan,	*Tolono*,	Eng. and Mod. Lang.
Burns, Lubin Ray,	*Champaign*,	Natural Science.
Bussey, Clyde George,	*Lanark*,	Engineering.
Campbell, George Henry,	*Edgewood*,	Natural Science.
Campbell, Walter,	*Brimfield*.	———
Carr, Walter Scott,	*Argenta*.	———
Carswell, Arthur Scott,	*New City*,	Electrical Engineering.
Chapin, Clarence Willard,	*DeLand*.	———
Chatten, Melville Clark,	*Quincy*,	Architecture.
Chester, Wilfred Dudley,	*Champaign*,	Mining Engineering.
Church, George Leonard,	*Atlanta*,	Eng. and Mod. Lang.
Cook, Harvey,	*Tolono*,	Chemistry.
Crayne, William E.,	*Champaign*,	Mechanical Eng.
Crighton, William Collier,	*Champaign*,	Civil Engineering.
Duffy, Sherman,	*Ottawa*,	Eng. and Mod. Lang.
Dunkin, Will Van.	*Blue Grass*,	Eng. and Mod. Lang.
Drake, Louis Sanford,	*Chicago*,	Eng. and Mod. Lang.
Drury, George Edward,	*Wilmette*,	Architecture.

Evans, Robert Herman,	*Bloomington,*	Architecture.
Everett, Frank Milton,	*Quincy,*	Electrical Engineering.
Feigley, Samuel Henry,	*Rock Falls,*	Civil Engineering.
Ferguson, Harry Taylor,	*Sterling,*	Eng. and Mod. Lang.
Feuerbach, William John,	*St. Louis, Mo.,*	Architecture.
Fitzgerald, John Richard,	*Bethany,*	Eng. and Mod. Lang.
Fouts, Lewis Hayden,	*Chicago,*	Eng. and Mod. Lang.
Garber, Emanuel,	*Washington,*	Natural Science.
Granger, Guy,	*Champaign,*	Mechanical Eng.
Greeley, Carlton Lloyd,	*Waterman,*	Natural Science.
Green, Frank H.,	*Ivesdale,*	Mechanical Engineering.
Haley, Arthur Fenn,	*Champaign,*	Mechanical Eng.
Hanker, William Julius,	*Toledo,*	Architecture.
Harvey, William Keith,	*Blue Mound,*	Mechanical Eng.
Hindman, John,	*Buckley,*	Eng. and Mod. Lang.
Honens, Fred William,	*Milan,*	Civil Engineering.
Hughes, Frank Alexis,	*Okawville,*	Civil Engineering.
Huston, Fred Thales,	*Blandinsville,*	Natural Science.
Jackson, Z. Edward,	*Atchison, Kan.,*	Mechanical Eng.
Jones, Fred R.,	*Neponset,*	Mechanical Eng.
Keeler, Frederic Blair,	*Earlville,*	Architecture.
Kent Louis Maxwell,	*Danville,*	Electrical Engineering.
Ketchum, Richard Bird,	*La Prairie,*	————
King, Harless Warden,	*Joliet,*	Architecture.
Leigh, Charles Wilber,	*La Prairie Centre,*	————
Lemon, William Clarence,	*Morganfield, Ky.,*	Civil Eng.
Leonhard, Adolph,	*Trenton,*	————
Lewis Charles Milton,	*Blue Mound,*	Architecture.
Lienesch, Walter Herman,	*O'Fallon,*	Engineering.
Liese, George Charles,	*Nashville,*	Natural Science.
Lilly, John Crozier,	*Champaign,*	Eng. and Mod. Lang.
Lovitt, Walter,	*Kansas City, Mo.*	————
McBride, Willis Brammer,	*Taylorville,*	Civil Engineering.
McConney, Porter David,	*Peoria,*	Mechanical Engineering.
McGrath, John,	*Keithsburg,*	Mechanical Eng.
MacGregor, Leonard Allen,	*Earlville,*	Architecture.
McKee, Eli Earl,	*Rising,*	Architecture.
McKnight, Robert Wade,	*Girard,*	————
McQuaid, Charles William,	*LeRoy, Kan.,*	Engineering.
Maxwell, Irvine William,	*Savoy,*	Mechanical Engineering.
Mell, Joseph Lenard,	*San Jose,*	Agriculture.

Mettler, Joseph Ferdinand,	*Rankin,*	Latin.
Millar, Harry Knowles,	*Mattoon,*	Civil Engineering.
Miller, Frank Arthur,	*Chicago,*	Mechanical Engineering.
Mitchell, George White,	*Chicago,*	Architecture.
Morrow, Clarence Gifford,	*Champaign,*	Agriculture.
Mueller, Arnold William,	*Allegheny, Pa.*	Architecture.
Naughton, Charles Colby,	*Champaign,*	Chemistry.
Newcomer, Joseph Hardin,	*Petersburg,*	Eng. and Mod. Lang.
Noble, Charles William,	*Chicago,*	Architecture.
Noble, Harry Charles,	*Champaign,*	Engineering.
O'Leary, Arthur.	*Keithsburg,*	Mechanical Eng.
Oyler, Harry Schuyler,	*Mt. Pulaski.*	——— ———
Parker, Walter A.,	*Champaign.*	Eng. and Mod. Lang.
Parry, Joseph Lawrence,	*Tolono,*	Eng. and Mod. Lang.
Perkins, Allie Christian.	*Tolono.*	Elec. Engineering.
Perry, George G.,	*Urbana.*	Architecture.
Pfeffer, John Edward.	*Bondville.*	Mech. Engineering.
Pierce, Will Thomas.	*Mt. Carroll,*	Civil Engineering.
Piper, Caryl Sylvester.	*Grand Crossing.*	Mech. Eng.
Pope, George Albert,	*Chicago,*	Mech. Engineering.
Ray, George Joseph,	*El Paso,*	———————
Read, Frank Albert,	*Lily Lake,*	Eng. and Mod. Lang.
Reardon, Edward Emmett.	*Boynton,*	———————
Rice, Fred Lee.	*Champaign,*	———————
Roberts, John Jacob.	*Sadorus.*	———————
Rose, William,	*Columbia,*	Engineering.
Rouse, John Edward,	*Gays,*	Classical.
Rowe, Herbert Brunskill,	*Redmon,*	Eng. and Mod. Lang.
Seyffert, Alberto F.,	*Chihuahua, Mex.,*	———————
Shearer, Hallock,	*Gard's Point.*	Agriculture.
Sherman, Cecil Harvey,	*Elgin,*	Mech. Engineering.
Simons, Alexander Martin,	*Quincy,*	Elec. Engineering.
Smith, Louie Henrie,	*Crystal Lake,*	Chemistry.
Southward, Harry A.,	*New Boston,*	———————
Sperry, James Frank,	*Champaign,*	Mech. Engineering.
Spurgin, William Grant,	*Urbana.*	Classical.
Stark, Robert Watt,	*Augusta,*	Chemistry.
States, William Daniel,	*Elwood.*	Mech. Engineering.
Stokes, Hurlie Albert,	*Carthage,*	Mech. Engineering.
Stroker, George Dick,	*Palatine,*	Civil Engineering
*Sullivan, John Laurence.	*Mansfield,*	Eng. and Mod. Lang.

*Deceased.

Sweney, Don,	*Mason City,*	———————
Tait, Daniel Webster,	*Macon,*	Agriculture.
Thompson, Risty Melroy,	*Fairland,*	———————
Thornhill, Charles Calaware,	*Champaign,*	Engineering.
Tilton, Harry William,	*Mt. Carmel,*	Elec. Engineering.
Tobias, Frank Owen,	*Peotone,*	Mech. Engineering.
VanMeter, Seymour,	*Cantrall.*	Architecture.
Van Ostrand, Charles Edwin,	*Pekin.*	Civil Engineering.
Walker. George Washington.	*Walker,*	Agriculture.
Warfield. Ray Mary,	*Quincy,*	Electrical Engineering.
Warnecke, Carl Marie,	*Denver, Col..*	Architecture.
Watson, Ebenezer Bliss.	*Waverly,*	Agriculture.
Weeks, Charles Henry.	*Upper Alton.*	Architecture.
West. George,	*Marseilles.*	Mech. Engineering.
White, Solon Marks,	*Sandwich.*	Natural Science.
Whittemore, Leonard Archie,	*Verona,*	Mechanical Engineering.
Williamson, John Arthur,	*Nashville, Tenn.,*	Mechanical Eng.
Wilmes, Fred Henry,	*Quincy.*	———————
Woods. Ray Elmo,	*Gardner.*	———————
Wookey, Murray Adrian,	*Peoria,*	Architecture.
Woolsey, Theo. Dwight,	*Polo.*	Latin.
Young, Clyde Cyrus,	*Stongington,*	Natural Science.
Zimmerman Walter,	*Earlville,*	Mech. Engineering.
Bibler, Adda,	*Urbana.*	Eng. and Mod. Lang.
Bibler, Anna,	*Urbana,*	Eng. and Mod. Lang.
Bonner, Kate Porter Harper,	*Champaign,*	Eng. and Mod. Lang.
Bradshaw, Alice Rice,	*Urbana.*	Eng. and Mod. Lang.
Burt, Myra Ernestine,	*Urbana.*	Architecture.
Cross, Daisy,	*Rantoul.*	Eng. and Mod. Lang.
Hill, Mary,	*Champaign.*	———————
Howse, Darlie P.,	*Champaign.*	———————
Kent, Jennie Isabella,	*Urbana,*	Eng. and Mod. Lang.
Leal, Mary Cloelia,	*Urbana.*	———————
Mason. Mildred,	*Plainfield,*	Eng. and Mod. Lang.
Moore. Minnie Rose,	*French Grove.*	———————
Noble, Isabelle.	*Champaign.*	Eng. and Mod. Lang.
Noble, Mary Elizabeth,	*Champaign,*	Eng. and Mod. Lang.
O'Neill, Marian Madeline,	*Champaign,*	Eng. and Mod. Lang.
Palmer, Mabel,	*Champaign,*	Eng. and Mod. Lang.
Peck, Harriet Stella,	*Fisher,*	Eng. and Mod. Lang.
Powers. Florence Victoria,	*Tiskilwa.*	———————

Sabin, Nellie,	*Stonington.*	———————
Schenk, Clara,	*Fisher.*	———————
Shlaudeman, Maud,	*Decatur,*	Eng. and Mod. Lang.
Sim, Anna M.,	*Urbana.*	———————
Starkweather, Pearl Belle,	*Champaign.*	———————
Stokes, Birdie Corneilia,	*Urbana,*	Eng. and Mod. Lang.
Stone, Ethel,	*Champaign*	———————
Wilkinson, Luella Jane,	*Argenta.*	———————

SPECIAL STUDENTS.

Cook, Walter Scott Downing,	*St. Louis, Mo.,*	Architecture.
Crawford, Henry Virden,	*Virden,*	Architecture.
Friess, John Peter,	*Mascoutah,*	Architecture.
Herbel, Emil Hartman,	*Jacksonville,*	Architecture.
Lucas, Frank,	*Champaign,*	Chemistry.
McKinney, Newton Charles,	*Camargo,*	Agriculture.
Pierson, Ora,	*Indianapolis, Ind.,*	Architecture.
Rogers, Herbert Dinwiddie,	*Peoria,*	Architecture.
Saunders, Oliver Clinton Thornton,	*St. Joseph,*	Chemistry.
Stoolman, Winfield,	*Champaign,*	Architecture.
Todd, Daniel Malcolm,	*Elgin,*	Architecture.
Aspern, Helen,	*Champaign,*	Art and Design.
Besore, Ida May,	*Urbana,*	Art and Design.
Brown, Katherine,	*Orcana,*	Natural Science.
Harwel, Mittie,	*Champaign,*	Music.
Maxwell, Nellie,	*Champaign,*	Art and Design.
McIntosh, Mabel C. U.,	*Champiagn,*	Modern Languages.
McIntosh, Winifred W. S.,	*Champaign,*	Modern Languages.
Palmer, Vesper,	*Champaign,*	Art and Design.
Pound, Maggie May,	*Champaign,*	Art and Design.
Pound, Martha Eleanor,	*Champaign,*	Music.
Paradis, Mrs. Mattie Ann,	*Urbana,*	Modern Languages.
Riddle, Florence Newell,	*Champaign,*	Art, Design, Music.
Stoltey, Ada Gay,	*Champaign,*	Art, Design, Music.

SUMMARY.

BY CLASSES.	MEN.	WOMEN.	TOTAL.
Resident Graduates	5	3	8
Seniors	41	5	46
Juniors	50	7	57
Sophomores	93	8	101
Freshmen	157	27	184
Preparatory	137	26	163
Special	11	13	24
Total	494	89	583

BY COURSES.			
Agriculture	11	......	11
Mechanical Engineering	88	......	88
Electrical Engineering	29	......	29
Civil Engineering	87	......	87
Mining Engineering	6	......	6
Architecture	91	1	92
Chemistry	41	4	45
Natural History	40	13	53
Art and Design	......	7	7
Music	......	2	2
English and Modern Languages	54	45	99
Latin	3	1	4
Classical	12	5	17
Pedagogy	1	......	1
Not Specified	31	11	42
Total	494	89	583

HOLDERS OF SCHOLARSHIPS, PRIZES, AND COMMISSIONS.

HONORARY SCHOLARSHIPS.

The following named counties have been represented during the year by the students named:

Adams.	Woodruff, Thomas Tyson.
Brown,	Bartlett, Henry Emmett.
Bureau,	Forbes, Robert Humphrey.
Champaign,	Snodgrass, William.
Clinton,	Earl, Mark Alden.
Coles,	Bennett, Sarah.
Cook,	Hart, Ralph Warner.
Crawford,	Templeton, Benjamin Franklin.
Douglas,	Carmack, Clyde Robert.
Du Page,	Heideman, George Hermann.
Ford,	Lowry, James Percival.
Kane,	Shepardson, John Eaton.
Livingston,	Holtzman, Stephen Ford.
Mercer,	Boyle, Hugh G.
Ogle,	Woolsey, Ola C.
Peoria,	Beasley, Harrison Easton.
Rock Island,	Johnson, Harriette Augusta.
St. Clair,	Klingelhoefer, Charles Benjamin.
Scott,	Gibbs, William David.
Washington,	Ayers, Clarence Otto.
Whiteside,	Reeves, Harley Edson.
Winnebago,	Carpenter, Frank Albert.

WINNERS IN JUNIOR PRIZE SPEAKING CONTEST.

Forbes, Robert Humphrey, First Prize.

Kiler, Charles Albert, Second Prize.

COMMISSIONED BY THE GOVERNOR AS CAPTAINS BY BREVET IN THE ILLINOIS NATIONAL GUARD.

Eno, Frank Harvey.
Harvey. Alfred Ernest.
Clarke, Edward Besançon.
Clarke. Frederic Woodruff.
McClure. Ora Deal.
Smolt. Franklin Oscar.
Wallace. Ross Strawn.
Vail, Charles Davis.

SPECIAL COMMENDATION.

The following have been named to the Secretary of War as worthy of special commendation:

Eno, Frank Harvey.
Harvey, Alfred Ernest.
Smolt. Franklin, Oscar.

WINNER OF HAZLETON PRIZE MEDAL, 1892.

Atwood, Levi Patten.

ROSTER OF OFFICERS AND NON-COMMISSIONED OFFICERS OF THE BATTALION FOR 1891–2.

Majors: P. T. Burrows, R. A. Mather.
Adjutant: Captain E. C. Craig.
Sergeant Major: S. K. Hughes.

Co. A—Captain, F. M. Spalding; 1st Sergeant, J. H. Reed; Sergeant, W. D. Teeple; Corporals, C. C. Webster, M. S. Fletcher, H. O. Herdman, L. E. Roby, F. A. Carpenter, C. Barry.

Co. B—Captain, W. J. Graham; 1st Sergeant, L. P. Atwood; Sergeant, W. K. Yeakel: Corporals, W. N. Vance, H. E. Reeves, J. C. Quade, P. Junkersfeld, A. M. Munn, Z. E. Jackson.

Co. C—Captain M. A. Earl; 1st Sergeant, E. A. Johnston; Corporals, C. W. Noble, J. L. Mathews, J. A. Green, J. E. Shepardson, L. A. McGregor, S. F. Holtzman.

Co. D—Captain, J. T. Stewart; 1st Sergeant, C. L. Babcock; Sergeant, E. W. Stocker; Corporals, E. V. Capps, F. King, W.C. Lemen, F. L. Busey, H. G. Boyle, Wm. Noble.

Artillery Detachment—Captain, C. D. Brownell; 1st Sergeant, W. H. Kimball; Corporal, P. B. Randall.

Band—Samuel Doxey, Drum Major; C. A. Elder, Leader.

LIST OF GRADUATES.

[Alumni of the University are requested to send to the Regent's office prompt notice of any changes which should be made in the following lists.]

Class of 1872.

Burwash, Milo B., Farmer................................Savoy.
Davis, John J., B.S., Physician......................Racine, Wis.
Drewry, Henry N., Physician.......... ....Effingham.
Flagg, Alfred M., Capt., Lawyer............... .Sioux Falls, Dak.
Hatch, Miles F., Banker and Mill Owner...........Tacoma, Wash.
Lyman, George H., Real Estate Agent.. ....Ft. Smith, Ark.
Mathews, James N., M.L., Physician......................Mason.
Parker, Calvin E., Banker..... ....Philo.
Reiss, Willis A., Teacher...................... ....Belleville.
Reynolds, Stephen A., Capt., Lawyer....................Chicago.
Rickard, Thomas E., Farmer.........................Springfield.
Ricker, N. Clifford, M. Arch., Professor of Architecture, University of Illinois......................................Urbana.
Rolfe, Charles W., M.S., Professor of Geology, University of Illinois.... ....Urbana.
Silver, Charles W., Merchant....................Kansas City, Mo.
Silver, Howard, Principal of Public Schools........Janesville, Wis.
*Teeple, Jared, April 2, 1888..... ....Marengo.
Wharton, Jacob N., Builder........... ....Chicago.
Whitcomb, Alonzo L., Physician...................St. Paul, Minn.
Wood, Reuben O., Capt., Farmer........................Woodburn.

Class of 1873.

Graham, Charles P., Clergyman................. New Salem, Kan.
Hatch, Fred L., M.S., Farmer ....Spring Grove.
Hayes, Charles I., B.S., Mining Engineer........Breckenridge, Col.
Hennessey, Augustus L., Editor.........................Chicago.
Hill, Edgar L., Capt., Farmer.......................Austin, Texas.
Hook, Samuel H., Miner......................... Black Hills, Col.
Morrow, Andrew T.
Ockerson, John A., C.E., Civil Engineer in U. S. Service, with Miss. River Commission.......................St. Louis, Mo.
Phillips, Parley A., Farmer ....Damascus

*Deceased.

Platt, Franklin C.. Capt., Lawyer and Banker......Waterloo, Iowa.
Porterfield, Elijah N.. City Civil Engineer...........Kearney, Neb.
Robbins. Henry E., M.S., Superintendent of Schools...Lyons, Iowa.
Swartz, Alex. C., C.E., Civil Engineer and Architect...Ogden, Utah.
Williams, Lewis E., Real Estate.................... Trinidad, Col.

Class of 1874.

Baker Ira O., C.E., Professor of Civil Engineering, University of Illinois..Champaign.
Campbell, John P., Physician..........................Winchester.
Drewry, Ebenezer L.. Co. Supt. of Schools............Chamberlain.
Eaton, Herbert, Printer...............................Bloomington.
Ells, William C., Civil Engineer....................City of Mexico.
Estep, Harvey C., Civil Engineer ....Anacostes, Wash.
Foster, Charles W., Lawyer...........................Champaign.
Gabrialial, Gregory, Missionary........................Asia Minor.
Gennadius, Parragiottis, B.S., Chief of Bureau of Agriculture and Director Agricultural School of Athens.. .Athens, Greece.
Jeffers, Charles P., Druggist....................Swampscott, Mass.
Pickrell, William, Manufacturer...................Beatrice, Neb.
Pierce, John L., B.A., Lawyer..... ....Norfolk, Neb.
Reynolds, Henry S., M.S. ....Providence, R. I.
Smith, Charles A., B.S., Draughtsman............Providence, R. I.
Storey, George, Civil Engineer.............. ......San Diego, Cal.
Watts, William, Physician ....Sylvania, Ohio.
Wharry, Walter W., Capt.
Cheever, Alice, Mrs. A. H. Bryan................ .....Champaign.
Potter, F. Adelia, B.L., Mrs. H. S. Reynolds......Providence, R. I.

Class of 1875.

Barnard, Delonzo E., Farmer... ....Manteno.
Barnes, Arthur E., B.S., Banker..................Kansas City, Mo.
Brown, Dillon S., of Brown & Brown, Bankers..............Genoa.
Brown, Ralph L., M.L., Lawyer and Real Estate......Ashland, Ky.
Coddington, Vantile W., Architect................. ......Wilmette.
Dobson, Franklin P., Capt.
Dunlap, Burleigh A., Lawyer.......................De Smet, Dak.
Dunlap, Henry M., M.S., Farmer............................Savoy.
Eaton, Ernest, Farmer...................... ....Downs, Ind. Ty.
Everhart, Winfield S., Capt., M.L., Lawyer...........Toledo, Ohio.
*Faulkner, James, Capt., Oct. 1, 1882...................Bloomfield.
Gridley. George N., Farmer.........................Prairie View.
Kenower. George F., M.L., Editor...................Wisner, Neb.
Lefler, John E.......... .. ..Denver, Col.
Lyford, Charles C.. B.S., Veterinary Surgeon....Minneapolis, Minn.
McCauley, John C...
Mueller, John, B.S., Instructor.....................Upsala, Sweden.

*Deceased.

Parks, James H., Co. Surveyor, Donley Co..........Clarendon, Tex.
Parsons, Fernando A., M.L., Banker...............Kingman, Kan.
Patch, Emory, Machinist.........................Janesville, Wis.
Pickrell, Watson, Lawyer. Commissioner Bureau of Animal Industry.................................Beatrice, Neb.
Pollock, Wm. C., Lawyer.......................Washington, D. C.
Robinson, Elna A., Machinist..........................Champaign.
Scovell, Melville A., M.S., Director and Chemist of Kentucky Agr. Exp. Station and State Chemist..........Lexington, Ky.
Scudder, Clarence O., M.L., Superintendent of Schools...South Evanston.
Shawhan, George R., B.L., County Superintendent of Schools..Urbana.
Tyndale, Henry H., Lawyer...................London, England.
Warner, L. Fenn., Civil Engineer...................Auburn, Cal.
Anderson, Laura, Mrs. J. R. Greenhalgh...............Champaign.
Campbell, Amanda, Mrs. Milton Moore.................Mansfield.
Hullinger, Kate, Mrs. Sterling....................Parker, Dakota.
Kariher, Kate, Mrs. Albert Eisner.....................Champaign.
Kellogg, Flora L., Mrs. Hudson.................Coldwater, Iowa.
Lee, Alice, B.L., Mrs. V. W. Coddington..........Kansas City, Mo.
Pierce, Fannie, Stenographer........................Norfolk, Neb.
Steele, Mary C., B.L., Mrs. N. C. Ricker...................Urbana.
Stewart, Maggie E., M.L., Mrs. H. E. Robbins........Lyons, Iowa.

Class of 1876.

Allen, Ralph, Farmer.................................Delavan.
Ballou, Edward L., Miner..................................Igo, Cal.
*Campbell, James W., January 22, 1890.............Los Gatos, Cal.
Chandler, William B., Lawyer.........................Pueblo, Col.
Clark, Charles W., Architect........................St. Louis, Mo.
Drake, James F., Lawyer.............................S. Pueblo, Col.
Gill, John D., Lawyer..............................Duluth, Minn.
Gore, Simeon T., Architect..............................Chicago.
Gregory, Charles E, Capt., Lawyer...............Carrington, Dak.
Knibloe, Walter E., Principal of High School....St. Augustine, Fla.
Mackay, Daniel S., Farmer............................Mt. Carroll.
Mackay, Henry J., Lawyer.............................Mt. Carroll.
Mackay, William A., Capt., Cashier First National Bank...Madison, S. Dak.
Mahan, H. Weston, Real Estate...........................Chicago.
*Mann, A. Howard, April 23, 1879................Winnebago, Cal.
Mann, Frank I., Capt., Nurseryman.......................Gilman.
Mann, James R., Capt., Lawyer..........................Chicago.
Noble, Lewis R., Capt., B.S., Insurance Agent............Mattoon.
Oliver, Will F., Capt., Physician...................Trafton, Wash.
Palmer, Frank M., Capt., Lawyer.........................Clinton.
Pierce, Elon A., Teacher............................Santa Rosa, Cal.

*Deceased.

Rhodes, James F., Lawyer........................Durango, Col.
Scribner, Artemus C., Lawyer......................Seattle, Wash.
Starr, Frank A. E., Capt., M.L., Lawyer.............Portland, Ore,
Stookey, D. Wesley, Tile Manufacturer....................Buffalo.
Weston, Charles H., Merchant and Banker.......Hay Springs, Neb.
*Wild, George A., November, 1881................Las Animas, Col.
William, Thomas T., Farmer.................................Sterling.
Holton, Mattie S., Mrs. Charles Krebbs...................Chicago.

Class of 1877.

Abbott, Theodore S., B.S., Civil Engineer...........Laredo, Texas.
*Allen, Charles W., B.L., July 8, 1880.................Harristown.
Barry, Charles H., Capt., Insurance Agent................Erie, Pa.
Barry, Frank Capt., B.L., Publisher..............Milwaukee, Wis.
Blackall, C. H., Capt., M.A., Architect..............Boston, Mass.
Brush, Charles E., Architect.......................Kansas City, Mo.
Buckingham, William, Mining Engineer......................Chicago
Bumstead, James E., Physician and Surgeon..............Dundee.
Clay, Luther G., Horticulturist...............................Cobden.
Crow, Benjamin F., Superintendent Car Works.......St. Louis, Mo.
Elliott, Charles G., C.E., Civil Engineer...............Bloomington.
Faulkner, Richard D., Merchant...............San Francisco, Cal.
Gibson, Charles B., Capt., Professor of Chemistry, College of Physicians and Surgeons.............................Chicago.
Gilkerson, Hiram, Capt., Farmer.......................Hampshire.
Gilkerson, John, Lawyer.......................................Chicago.
Kennedy, Allen G., Capt., Secretary and Treasurer Manufacturing Company.....................Minneapolis, Minn.
Lewis, Edward V., Capt., Manufacturer,..............Omaha, Neb.
Llewellyn, Joseph C., B.S., Farmer......................Monticello.
*McPherson, John, January 26, 1886...............Lexington, Ky.
Moore, John F., Architectural Draughtsman......Davenport, Iowa.
Rice, George C., Merchant.................................Oakwood
Seymour, John L., Civil Engineer.....................San Jose, Cal.
Sim, Coler L., Capt., Cashier Wichita Banking Co.....Wichita, Kas.
Spence, Franklin, Farmer.....................................Hamilton
Stayman, John M., Machinist.................................Chicago
Stoddard, Ira J., Capt., Civil Engineer.................Champaign.
Ward, Walter P., B.L., Lawyer.......................Spencer, Iowa.
Whitham, R. F., Capt., B.L., City Engineer........Olympia, Wash.
Wright, Myron J., Superintendent with the Urie Dredge Manufacturing Company..........................Kansas City, Mo.
Adams, Nettie, Mrs. W. Bent Wilson.................Lafayette, Ind.
Bogardus, Eva, Mrs. T. L. Price,.............. Pound Ridge, N. Y.
Broshar, Cornelia, Artist...................................Champaign.
Conn, Emma, Music Teacher.............................Champaign.
Falls, Ida Bell...Champaign.
Gregory, Helen B., B.A., at home.................Kansas City, Mo.
Maxwell, Emma C..................................Philadelphia, Pa.

*Deceased.

Page, Martha, Mrs. R. F. Whitham..................Olympia, Wash.
Piatt, Emma C., B.S., Mrs. J. C. Llewellyn.......Warrensburg, Mo.
Skinner, Velma C., Mrs. W. P. Ward.................Spencer, Iowa.
Smith, Avis E., M.S., Physician.................. ..Kansas City, Mo.
Switzer, Gertrude, Mrs. H. Peddicord ....Champaign.
Victor, Carrie D., Mrs. Ira J. Stoddard............. ...Champaign.

Class of 1878.

Baker, Edward J., B.S., Farmer..............................Savoy.
Ballard, Charles K., B.S ....Madison, Dak.
Bridge, W. E., Capt., B.S., Merchant................Detroit, Mich.
Brown, Frank A., Real Estate and Banker.........Aberdeen, S. D.
Bullard, Samuel A., B.S., Architect......................Springfield.
Burr, Ellis M., B.S., Machinist...........................Champaign.
Coffin, Frank S., Lawyer....... ....Nashville, Tenn.
Coffman, Noah B., B.S., Banker.....................Chehalis Wash.
Dean, Frank A., Capt., Merchant.... ....Holdredge, Neb.
Francis, Fred, Machinist.................................Neponset
Gaffner, Theodore, Physician........ ....Trenton
Gregory, A. T., Capt., B.S., Lawyer...............Kansas City, Mo.
Hauser, Henry A., Capt., B.S., Civil Engineer........Topeka, Kan.
Lee, Edward O., B.L., Lawyer........... ....Sidney, Neb.
Lloyde, Frank H., Merchant............ ....Champaign.
McLane, James A., B.S., Real Estate.................. ....Chicago.
Moore, Aaron H., Merchant............... ....Louisville.
Morava, Wensel, Capt., B.S., Machinist...................Chicago.
Patchin, John, Lawyer...................... ...Manchester, Mich.
Pollock, James L., B.L., Lawyer... ....Mt. Vernon.
Richards, Chas. L., B.S., Lawyer.............. ......Hebron, Neb.
Rudy, Wm. D., B.S., Special Agent P. O. Dept...Washington, D. C.
*Rutan, Abram R., June 4, 1887..... ....Raton, N. Mex
Savage, Manford, B.L., Lawyer..................... .Hebron, Neb.
Sawyer, Hamlin W., Capt.
Sparks, Hosea B., Capt., Miller...............................Alton.
*Spradling, W. F., November 30, 1881..............Greenleaf, Kan.
Sprague, Martin, Lawyer........ .... .Springfield.
Weed, Mahlon O., B.S., Teacher..................Greenwood, Neb.
Whitlock, J. F., Capt., B.S., Lawyer............ ......Huron, Dak.
Ziesing, August, Capt., B.S., Supt. Bridge Works..........Chicago.
Zimmerman, H. W., B.L., Chemist........... ....LaSalle.
Columbia, Emma, Mrs. J. R. Mann.........................Chicago.
Culver, Nettie M., B.L., Mrs O. Ellison.............St. Paul, Minn.
Davis, Nannie J., Mrs. M. A. Scovell...............Lexington, Ky.
Deardorf, Sarah C., B.S., Mrs. B. F. Donnell.... ..Winfield, Kan.
*Estep, Ida M., January 25, 1887 ....Rantoul.
Estep, Jessie......................................Seattle, Wash.
Larned, Mary S., Mrs. F. A. Parsons...............Kingman, Kan.
Mahan, Jennie C., Mrs. P. W. Plank... ....Lincoln, Neb.
Page, Emma, M.L............. ....Manville, Wy,
Page, Mary L., B.S., Architectural Draughtsman...Olympia, Wash.

*Deceased.

Class of 1879.

Beardsley, H. M., M.L., Lawyer....................Kansas City, Mo.
Bourne, H. P., B.S., Civil Engineer....................Alamosa, Col.
Butler, Wm. N., Lawyer..Cairo.
Coburn, R. P., Capt., B.S., Civil Engineer ......San Antonio, Tex.
Freijs, Charles T., Capt., Architect. ....Chicago
Gunder, James, B.S., Merchant. ....Homer
Hoit, Otis W., B.S., Farmer. ....Geneseo.
Johnson, Wm. P., Capt., Manager Coal Co ......Milwaukee, Wis.
Kays, Emory, Farmer.. ....Phoenix, Ariz.
Kimble, Willis P., B.S., Civil Engineer.... ....Marceline, Mo.
Kuhn, Isaac, B.S.. Merchant ... .Prescott, Ariz.
Lee, Elisha, B.S., Farmer...................................Hamlet
*Milton, Franklin S., B.S., July 23, 1882.............Plattville, Col.
Stanton, S. C., Capt., B.S.. Physician.......................Chicago.
Swannell, Arthur, Capt., Merchant.... ....Kankakee.
Taft, Lorado Z., M.L., Sculptor..........................Chicago.
Thompson, W. A., Capt., B.S., Banker......................Chicago.
Walker, Francis E., Capt., Farmer ....
Whitmire, Clarence L.. Physician and Surgeon......Waverly, Iowa.
Butts, Augusta E., B.S.. Teacher .. ..Chicago.
Hale, Isabelle, B.S., Teacher ... .Kewanee.
Kimberlin, Nettie D., Teacher.......................Detroit, Mich.
McAllister. Nettie C., B.L., Mrs. J. H. Miller... Minneapolis, Minn.

Class of 1880.

Bley, John C., B.L., Machinist.... ....Chicago.
Briles, Bayard S., B.S., Physician...............................Etna.
Conklin, Roland R., M.L., Banker................Kansas City, Mo.
Cook. Charles F., B.S., Merchant.....................Edwardsville.
Groves, Charles W., Principal of High School ....Kankakee.
Hafner, Christian F....................................Oak Park.
Harden. Edgar E., Banker. ....Liberty, Neb.
Hatch. Frank W., B.A., Farmer................... Spring Valley.
Hyde, Benjamin F., Draughtsman..........................Chicago.
Jones. Richard D., Lawyer.....................................Henry.
Kingsbury, Charles S., B.L...
Neely, Charles G., B.L., Lawyer ....Chicago.
Parker, Wm. L., B.S, Machinist......................Olympia, Wash.
Robinson, A. F., C.E., Civil Engineer.........................Chicago.
Robinson, A. S., Capt., B.S., Engineer.........................Joliet.
Savage, George N., M.L., Lawyer..................Olympia, Wash.
Sondericker. Jerome, C.E., Assistant Professor Applied Mathematics, Institute of Technology, Boston.. .....Newton, Mass.
*Travis, Wm. W., September 30, 1883.................Bloomington.
White, Frank, B.S., Farmer...................Valley City, N. Dak.
Bacon, Kittie L., B.L... ....Whatcom, Wash.

*Deceased.

Batcheler, Augusta, Mrs. W. T. Eaton..... .. ...Texarkana, Ark.
Lucas, Corda C., Teacher....... ....Camargo.
Parker, Minnie A., B.L., Mrs. V. N. Hostetler.............Decatur.
Pearman, Ida, B.L., Mrs. C. E. Stevens...........Logansport, Ind.
Watson, Ella M., B.S., Mrs. J. H. Davis...........Kansas City, Mo.

Class of 1881.

*Allison, James G., April 21, 1891............... .....Anthony, Kas.
Armstrong, James E., B.S., Teacher....................Englewood.
Beach, Bayard E., B.L., Banking and Real Estate...Huron, S. Dak.
Bellamy, Albert, Merchant........................ ....Girard
Birney, Frank L., Physician........... ... .Denver, Col.
Boothby, Arthur, B.S., Draughtsman............Indianapolis, Ind.
Boyd, Comma N., Capt., Farmer.........................Sheffield
Coddington, Arch. O., M.L., Teacher...... ....Chicago.
Cooper, Fred. O., B.S., Cashier Citizens' Bank......VanBuren, Ark.
Davis, Arthur E., B.L., Druggist....... .....Sulphur Spring, Tex.
Dennis, C. H., Capt., B.L., City Editor on Chicago News...Chicago.
Dresser, John C., B.S., Bookkeeper............ ......Jacksonville.
Forsyth, James, Engineer............................Gilroy, Cal.
Hammett, F. W., Capt., B.S., Tile Manufacturer..........Tuscola.
Hill, Fred L., Draughtsman...............................Chicago.
Hill, Thomas C., Capt., B.A., Teacher................Kensington.
Kingman, Arthur H., Clerk.........................Boston, Mass.
McKay, Francis M., B.L., Principal of Douglass School ...Chicago.
Mansfield, Willis A., B.L., Physician ....Metamora.
Mason, William K., B.S., Farmer........................... Buda.
Morse, John H., Capt., Real Estate ....Kansas City, Mo.
Pearman, J. Ora, B.S., Physician........................Palatine.
Pepoon, Herman S., B.S. Physician and Surgeon.......Lewistown.
Pepoon, William A., Farmer..................... .Baker City, Ore.
Philbrick, E., Capt., B.S., Civil Engineer.. ....Chicago.
*Pletcher, Francis M., B.S...................................... ..
*Porter, Frank H., Capt., 1885............................... ....
Ross, Sprague D., B.S., Real Estate............Grand Island, Neb.
Schwartz, Joseph, Druggist......... ....Salem.
Seymour, Arthur B., M.S., Assistant in the Cryptogamic Herbarium of Harvard University................Cambridge, Mass.
Slade, Byron A., Capt., B.S., Druggist.............Wabasha, Minn.
Stacey, Morelle, Stenographer.....................Brookfield, Mo.
Sturman, James B., B.L., Lawyer............... ....Chicago.
Talbot, A. N., Capt., C.E., Prof. Municipal and Sanitary Engineering, University of Illinois...................... Champaign.
Weston, Wm. S., B.L., B.S., Civil Engineer..... ...Topeka, Kas.
Wilson, Maxwell B., Farmer...............................Paris.
Baker, Kittie M., Mrs. J. G. Wadsworth............Lincoln, Neb.
Barnes, Bertha E., B.L., Mrs. S. D. Ross.......Grand Island, Neb.
Davis, Marietta, B.L., Mrs. H. M. Beardsley......Kansas City, Mo.

*Deceased.

Elder. Loretta K.. B.L.. Mrs. A. F. Robinson.............Chicago.
Hammett. Jennie M.. B.S.. Mrs. A. N. Talbot..........Champaign.
*Lawhead. Lucie M., B.S . May 1. 1884.................Champaign.
Lawrence. Nettie E.. Mrs. J. A. Allen.................Tulare. Cal.
Macknett. Metta. B.A.. Mrs. B. E. Beach..........Huron. S. Dak.
Thomas, Darlie, B.L., Bookkeeper.......................Chicago.
Wright, Jessie A., B.L., Mrs. H. E. Richardson........Mascoutah.

Class of 1882.

Bailey. S. G. Jr.. Capt.. B.S.................... ....Topeka. Kas.
Barnes. Charles C.................................Stella. Col.
Bridge. Arthur M., Capt.. Farmer..................Goldfield. Iowa.
Bullard, Benjamin F.. B.L.. Editor...............Forest City. Dak.
Bullard. George W.. B.S.. Architect................Tacoma. Wash.
Carman. W. B., Capt., B.S.. Physician... ....Rochester. N. Y.
Cole. Edward E., Capt.. Principal Public School..Grand Island. Neb.
Curtiss. Wm. G., Banker..........................Vernon. Texas.
Davis. Jeptha H.. Real Estate...................Kansas City. Mo.
Eichberg. David. Capt.. B.L., Lawyer....................Chicago.
Eisenmeyer. A. J.. Capt.. B.S., Pres. and Treas. Milling Co....
....Springfield. Mo.
Harrison. Samuel A., M.A......... ....Chicago.
Merritt. Charles H.. Bank Clerk................. . ...Mason City.
Neely, John R., B.L.. Government Clerk and Physician........
.... Washington. D. C.
Noble, Thomas, Mining Engineer..... ... ... San Diego. Cal.
Orr. Robert E.. Capt.. B. S.. Civil Engineer ....Evanston.
*Palmer, Charles W., B.L,, July, 1884..... .. ..Austin, Tex.
Peabody. Arthur, B.S., Architect....................... Chicago.
*Richards, Geo. W.. Capt., B.S.. May 15, 1889..............Chicago.
Roberts, Charles N., B.S., City Salesman with Hinds, Ketcham
Co...Chicago.
Rugg, Fred D., B.L., Merchant......................Champaign.
Sharp, Abia J., Capt., B.S., Machinist...........Harrisonville, Mo.
Shlaudeman, Frank, B. S., Supt. Decatur Brewing Co......Decatur.
Slauson, Howard, B.S., Lawyer....................Seattle, Wash.
Smith, Charles L., Capt.. B.L., Lawyer.........Minneapolis, Minn.
Spencer, Nelson S., B.S., Architect.............. ....Beatrice. Neb.
Taft, Florizel A.. B.S., Cashier in Bank.............Hanover, Kan.
Todd, James, B.S...Batavia.
Turner. Herbert, Capt.. Farmer, Campbell.............. ....Minn.
Wadsworth, J. G.. Capt., Banker....................Lincoln. Neb.
Andrus. Dora A.. B.L.. Mrs. J. C. Griffith..................Ashton.
Avery. Kittie C.. B.L.. At Home..................... Omaha. Neb.
Cole. Fronia R.. Mrs. W. F. Hall.....................McLeansboro.
Raley. Arvilla K., at home...............................Granville.

*Deceased.

Class of 1883.

Abbott. Edward L.. B.S., Bridge Constructor..............Chicago.
Adams, Charles F.. Naturalist..............................Champaign.
Bogardus. Eugene C.. B.S., Chemist..................Seattle, Wash.
Brainard, Clarence, Foreman Architectural Iron Works....Chicago.
Craig. William P., Capt., Lawyer........... ....Champaign.
Gates, Alphonso S., B.S., Civil and Mining Engineer............
....Spearfish, S. Dak.
Goltra, William F., Capt., B.S., Civil Engineer...Indianapolis, Ind.
Gray, Nelson A., Capt., B.L., Farmer...............Passadena, Cal.
Haven. Dwight C., Capt., Lawyer........... ....Joliet.
Heath, Wm. A., B.L., Cashier of Bank.................Champaign.
Hewes. George C.. B.S.. Missionary..........................India.
Huey. Joseph D.. Postmaster................................Huey.
Kenower, John T., B.S., Principal Seminary............Indian Ty.
Lewis, Ralph D... ....Chicago.
McCune. H. L., Capt.. B.L., Lawyer...............Kansas City, Mo.
Moore. William D., Engineer ....Chatham.
Palmer, Arthur, B.S.. S.D., Professor of Chemistry, University of Illinois..................... ... .Champaign.
Pierce, Fred D., Capt., B.S., Druggist.....................Chicago.
Piatt. Silas H., Express Agent......... ....St. Paul, Minn.
Scotchbrook. Geo. P., B.S......................Wessington. Dak.
Sondericker, William, B.A.
Weis, Joseph, B.S., Chemist ....Chicago.
*Ashby, Lida M., B.L., Mrs. C. L. Richards, September 1, 1888. ....Hebron. Neb.
Boggs, Hattie M., M.A., Mrs. I. A. Love ....Anthony, Kan.
Colvin, Mary S., Mrs. W. C. Hargis........... ....Bondville.
Fellows, Clara B.. A.L., Mrs. J. D. Day..........Rhinelander, Wis.
Gardner, Jessie, B.L., Music Student............ .....Cincinnati, O.
Healy, Grace, B.L., Mrs. C. L. Smith. ....Minneapolis, Minn.
Knowlton, Lizzie A., B.L. ....Lincoln, Neb.
Langley, M. Celeste, B.L., Mrs. H. B. Slauson.......Seattle, Wash.
Lewis, C. Florence. Mrs. C. J. Bills.................Fairbury, Neb.
Peabody, Kate F., B.L., Teacher.......................Hyde Park.
Stewart, Ella M.. Teacher.......... ....Champaign.
Wright, Minnie E., M.L., Mrs. J. M. Blackburn............Texas.

Class of 1884.

Abbott, William L., Electrician............................Chicago
Austin, James, Draughtsman .. ..LaCrosse, Wis.
Babcock, Guy H., Capt., Banker.... ....Arapahoe, Neb.
Barber, Henry H., B.S., Draughtsman ....Chicago.
*Bartholf, Emmet G., B.A., December 28, 1884............Chicago.
Bartholf, Wm.J.. B.A., Principal of VonHumbolt School...Chicago.
Braucher, Arthur C., B.S., Machinist.... ....Danville.

*Deceased.

Chapman, Norman W., Civil Engineer.... ....Omaha, Neb.
Eberlein, Frederick W., B.S., Physician ....Rutland.
Herdman, F. E., Capt., M.E., Mechanical Engineer. Indianapolis, Ind,
Hunt, Thomas F., B.S. Professor of Agriculture, University of Ohio. ....Columbus, O.
Kimball Edward R., B.S., Editor........ .... Aspen, Col.
Lietze Frederic A., B.S. .... Carlyle.
Lilly, Charles H., B.S., Merchant............... .... Seattle, Wash.
Lilly, James E., ... Seattle, Wash.
McCluer, Geo. W., B. S., Assistant Horticulturalist, Experiment Station, University of Illinois ... . Champaign, Ill.
Montezuma, Charles, B.S., Physician ....White Rock, Nev.
Morgan, George N., B.L., Lawyer ....Chicago.
Parr, Samuel W., M.S., Professor of Analytical Chemistry, University of Illinois ... .Champaign.
Philbrick, Solon, Capt., Lawyer ... . Champaign.
Roberts, Lewis C., Capt., Civil Engineer ... .Anacortes, Wash.
Rupp, Andrew O., B.L., Editor .. .. Monmouth.
Sizer, Lucius N., Capt., B.S., Civil Engineer..... ....Chicago.
Speidel, Ernst, B.S., Chemist ....Chicago.
Stevens, Hubert A., B.S., Civil Engineer ....Chicago.
Stratton, S. W., Capt., B.S., Professor of Physics, University of Illinois .... Champaign.
Van Petten, H. S., B.S., Druggist.. ... .Salt Lake, Utah.
Vial, Edmund R., B.S., Farmer..... .. ..Western Springs.
Wills, Jerome G., B.L., Lawyer... ....Vandalia
Ayers, Nettie, B.L., Assistant in Botanical Laboratory, University or Illinois .. ..Urbana.
Barber, Ella U., B.L., Teacher .... Hamilton, Ont.
Braucher, Alma E., B.S., Librarian Lincoln Library Association .... Lincoln.
Campbell, Juniata G., B.L., Mrs. T. F. Hunt ....Columbus, O.
*Clark, Lucy J., January 9, 1887 ....Champaign.
Conkling, Anna J., B.L., Mrs. A. B. Seymour.....Cambridge, Mass.
Ellis, Lola D., B.L., Mrs. James W. Forsythe...... .. Gilroy, Cal.
Hall, Lucy A., Mrs. S. W. Parr .... Champaign.
Hill, Cora J., Stenographer ....Chicago.
Kemball, Georgetta, B.L., Mrs. Harry L. Murray...........Maroa.
Krause, Josephine ... . Chicago.
Sim, Keturah E., B.L., Clerk in County Clerk's Office . Urbana.
Smith, Laura B., B.L., Mrs. S. H. Piatt .. .. St. Paul, Minn.

Class of 1885.

Abbott, A. N., Capt., Farmer.... . ...Union Grove.
Ayers, Judson F., Real Estate .. . .Ft. Scott, Kan.
Braucher, Wm. B., Machinist ....Danville.
Carter, Harry L., Civil Engineer...... ....E. Las Vegas, N. M.
Cole, Edward T., Physician................. ....Penfield.

*Deceased.

Colton, Simeon C., B.S. .....Chicago.
Dunlap, Robert L., Farmer .....Savoy.
Ellis, Geo. H., Analytical Chemist .....Evanston.
Hicks, Geo. L., B.L., Farmer .....Warren.
Hopper, Chas. S., Manufacturer .....Lincoln, Neb.
Kendall, Wm. F., B.S., Civil Engineer .....Rock Island.
Kent, James M., B.S., Electrician .....Kansas City, Mo.
Lantz, Milo P., Capt., B.S., Farmer .....Carlock.
Lattin, Judson, Capt., B.S., Draughtsman .....Chicago.
Manns, Albert, G.B.S., Ph.D., Manufacturing Chemist .....Chicago.
Marshall, S. L., Capt., B.L., Clerk .....Jacksonville.
Miller, John A., B.S., Ph.D., Professor of Chemistry and Toxicology, Niagara University .....Buffalo, N. Y.
Morse, E. L., Capt., B.L., Civil Engineer .....Red Cliff, Col.
North, Arthur F., Engineer .....Louisville, Ky.
Petty, Geo. R., B.S., Apiarist .....Pittsfield.
Rankin, Chas. H., Farmer .....Fall Creek.
Reynolds, Henry L., B.S. .....Seattle, Wash.
Ronalds, Hugh I., B.S., Portrait Artist .....Chicago.
Schleder, Theo. H., B.S., Engineer and Architect .....Chicago.
Schrader, Alfred T., Civil Engineer .....Chicago.
Smith, William H., ...Mt. Vernon, Wash.
Stockham, W. H., Capt., B.S., Manufacturer .....Chicago.
Swern, William C., Architect .....Chicago.
Vial, Fred K., B.S., Civil Engineer .....Chicago.
Wright, John E., Assistant City Editor Evening Post .....Chicago.
Woodworth, C. W., B.S., Ph.D., Entomologist at Experiment Station .....Fayetteville, Ark.
Clark, Kate F., B.S., Mrs. Wm. Stockham .....Chicago.
Earle, Mary T., B.S .....Cobden.
Jones, Emma T., B.L., Mrs. P. T. Spence .....Zanesville, O.
Merboth, Louisa, at home .....Spring Bay.
Owens, Bessie W., Mrs. J. H. Needham .....North Yakemo, Wash.
Paullin, L. Estelle, Medical Student .....Chicago.
Plank, Bessie G., Mrs. L. Thompson .....Cherokee, Iowa.
Switzer, Lottie, Teacher .....Champaign.
Weston, Abbie, Mrs. Wm. C. Swern .....Denver, Col.
Wills, Etta G., Bookkeeper and Cashier .....Vandalia.
Wright, Minnie S., Mrs. H. H. Barber .....Chicago.
Wright, Lizzie M., Mrs. Miles Canady .....Chicago.
Zellar, Josephine M. .....Spring Bay.

Class of 1886.

Babcock, Wm. A., B.L .....Ipava.
Bannister, Geo. S., B.S., Architect .....Chicago.
*Barrett, Dwight H., B.S., December 30, 1888 .....Baltimore, Md.
Bullard, S. Foster, Civil Engineer .....Tacoma, Wash.
Chitty, Wm. L., B.L., Lawyer .....Chicago.
Cromwell, John C., B.S., Draughtsman .....Chicago.

*Deceased.

Davis. James O., Capt., B.S., Civil Engineer .... Houston, Tex.
Dodds. Joseph C., B.L., Physician..... . ... Kankakee.
Endsley, Lee, B.S ... . Minneapolis. Minn.
Everhart, T. W. B., B.A., Agent .. .. St. Louis, Mo.
Fulton, James, B.S., Electrician .... Chicago.
Garrett, James H., B.S., Machinist .... Anaconda, Mont.
Garvin, John B., B.S., Librarian and Registrar..... Golden, Col.
Harris, James W., B.S., State School of Mines .... Elburn.
Hubbard, Harry T., Merchant.... .... Urbana.
*Jacobson, Jacob S., July 15, 1890 .... Denver, Col.
Kammann, Chas., B.L., Teacher................. .... Peoria
Lemme, Emil, Architect .. .. Los Angeles, Cal.
Lumley, Clinton G., B.L., Physician and Surgeon......... Chicago.
Morse, Henry M., B.S., Draughtsman .... Chicago.
Olshausen, W. A. G., B.S., Assistant Superintendent San Jose Mine.... .. ..Sierra Mojada, Mex.
Pence, Wm. D., Capt., Civil Engineer .... Temple, Texas.
Philbrick, Alvah, Civil Engineer ....Chicago.
Plowman, Wm. L., B.L .... Virden.
Roberts, Vertus B., Capt............ .... Chicago.
Sargent, Charles E., Machinist . ... Chicago.
Shlaudeman, Harry, B.S., Secretary and Treasurer of Decatur Brewing Co .... Decatur.
Thompson, Luther, Capt., Civil Engineer.. .. ... Cherokee, Iowa.
Whitmire, Z. L., B.L., Physician and Surgeon .... Tolono.
Wilder, Henry W., Capt., B.A., Secretary of Bridge Co ... Chicago.
Ayers, Belle, B.L., Teacher.............................. Chicago.
Elder, Nettie, Mrs. Charles F. Harris .. .. Urbana
Ermentrout, A. M., B.L., Teacher ... . Urbana
Fairchild, Rozina P., B.L., Mrs. J. O. Davis ...... Houston, Texas.
Huff, Bertie, B.L., Mrs. A. Philbrick .... Chicago.
Jaques, Minnie, B.L ... . Urbana.
Parminter, Grace E., B.L., Teacher... . ... Kearney, Neb.

Class of 1887.

Barclay, Wm., B.S., Civil Engineer .... Kansas City, Kas.
Blake, John B., B.S., Electrician .. .. Chicago.
Cantine, E. I., Capt., B.S., Civil Engineer ...... Rathdrum, Idaho.
Clark, Percy L., B.S., Physician .. .. Chicago.
Dryer, Ervin, B.S., Electrician... .... Chicago.
Fargusson, Mark, Capt., B.S., Civil Engineer .... New York.
Fink, Bruce, B.S., Teacher................. Elk Point, S. Dakota.
Gilbert, Frank M., Machinist... .... Baltimore, Md.
Gill, Rudolph Z., Architect .... Knoxville, Tenn.
Goldschmidt, Edward W., Electrician....... . .. . Chicago.
Goodwin, Phil A., Capt., B.S., Civil Engineer ..... Albany, Oregon.
Gregory, Grant, B.L., Commercial Reporter... .. Kansas City, Mo.

*Deceased.

Henson, Charles W., B.S., Draughtsman .... Chicago.
Johnson, Edward J., Civil Engineer.
Lloyde, Clarence A., B.S., Electrician.............. .. Oak Park.
Long, Frank B., Architect .... Chicago.
Lyman, Henry M., B.S., Electrician ... ...Canton, Ohio.
Mitchell, Walter R., B.S., Teacher......... .... Englewood.
Moore, Albert C., Capt., B.L., Freight Clerk...Walla Walla, Wash.
Powers, Mark, B.S., Professor in School of Pharmacy......Chicago.
Richards, Albert L., U. S. Assistant Engineer ....Quincy.
Rinaker, John I., Jr., Architect.............Spokane Falls, Wash.
Spear, Grant W., B.S., Machinist .... Aurora.
Tatarian, Bedros, B.S., Chemist. ....Chicago.
Taylor, Horace, Artist .... Chicago.
Waite, Merton B., Capt., B.S., Assistant in Section of Vegetable
Pathology... ....Washington, D, C.
William, Herbert B., B.S., Mining Engineering....... . Streator.
Eisenmeyer, Ida, Teacher .... Mascoutah.
Gayman, Angelina, Teacher.. ....Champaign.
Williamson, Mary H., B.L., Teacher ....Champaign.

Class of 1888.

Beadle, J. Grant, Architect. ....Peoria.
Bing, Benjamin, B.S., Chemist.. ....Urbana.
Bowditch, Fred D., Capt., B.L., Principal of High School.. ...
....Morristown, Tenn.
Bryant, William C., Draughtsman. ... . Kewanee.
Bush, Lincoln, B.S., Civil Engineer . ... Chicago.
Carter, Truman P., B.S., Professor in Illinois College..Jacksonville.
Davis, Frank L., Capt., Manager of Chicago Office Marble Co....
....Chicago.
Dewey, Ralph E., B.L., Teacher ....Penfield.
Ellison, Edward, Capt., B.S., Civil Engineer......Edwardsvile, Wy.
Folger, Adolphus D., Farmer ....Ridge Farm.
Frederick, Grant. B.L., Lawyer .. ..Wolsey, S. Dak.
Goldschmidt, A. G., B.S., Electrician. ....Davenport, Ia.
Goodall, Nathan P., B.L., Clerk ....Chicago.
Greaves, George, Chemist ....Aurora.
Grindley, Harry S., B.S., First Assistant Chemist, University of
Illinois . ... Champaign.
McHugh, Geo. B., Capt., B.S., Railway Postal Clerk...Toledo, Ohio.
Myers, Geo. W., Capt., B.L., Assissant Professor in Mathematics.
University of Illinois .. ..Urbana.
Patton, Jacob A., B.S., Physician and Surgeon...... ...Charleston.
Pickard, Edward W., Capt., B.A., Assistant City Editor Evening Post ....Chicago.
Place, Raymond M., B.L., Teacher........ .. .. Atlanta.
Roberts, Warren R., B.S., Civil Engineer... .... Chicago.
Samuels, John H., Capt., B.S., Machinist...............Springfield.

Schaefer, J. V. E., Machinist .... Chicago.
Taylor, John W., B.S., Insurance Agent............St. Louis. Mo.
VanGundy. Chas. P., B.S.. Chemist................Baltimore, Md.
Barnes, Mary Lena, B.L., Teacher ... .Champaign.
Beach, Etta L.. Mrs. J. E. Wright.............. . ...Chicago.
Connett. Ella, B.L., Teacher ....Farmington.
Eldridge, Mary A., B.L., Teacher... ....Galva.
Jillson, Nellie W.. Teacher ....Pittsburgh, Pa.
Mathers, Effie. B.S., at Home.........................Mason City.
McLean, Nellie, B.L., Mrs. C. G. Lumley................ Chicago.
McLellan, Mary C., at Home ....Champaign.
Stoltey, Ida M., Mrs. Geo. R. Petty......... ....Pittsfield.

Class of 1889.

Bennett, Cleaves, B.L., Assistant Librarian, University of Illinois....................... .. ..Champaign.
Bennett, Frederick M., B.L., Bank Cashier ...Fidalgo City, Wash.
Bopes, Charles N., B.S., Farmer .. ..Hamlet.
Briggs, Charles W., B.L., Principal of Schools..St. Lawrence, S. D.
Carver, Albert, Capt., B.S., Student .... Berlin, Germany.
Daugherty, Lewis S., B.S., Teacher................. ......Ottawa.
Dunaway, Horace, B.S., Civil Engineer ....St. Louis.
Evans, Rolla W., B.S., Architect. ... .Bloomington.
Kendall, Harry F., B.L., Law Student ....Champaign.
Kinder, David R., B.L., Teacher........ ....East St. Louis.
Kinkead, David R., B.S., Electrician ... . Chicago.
Lewis, C. Almon, B.S., Architect... .... Spokane Falls. Wash.
Lewis, James L., Capt., B.L., Lawyer ....Champaign.
Ligare, Edward F.
McConney, Robert D., B.S.. Electrician ... .Denver, Col.
Moles, Oliver S., B.L., Principal of Schools.... ... Canon City, Col.
Ross, Luther M , M.S., Teacher ....Wenona, Wis.
Steele, Phillip, B.S., Machinist..........................Chicago.
Weston, Nathan A., B.L., Principal East Side School...Champaign.
Weis, Herman L. ... .Tonica.
Bronson, Lilly O., Professional Nurse............. ....Urbana.
Coffeen, Amy, B.L., Music Teacher...................Champaign.
Church, Blanche A., B.L., Teacher.... ....Ottawa.
Paine. Leanah J., B.L.. Teacher ....Champaign.
Sparks. Mrs. Myrtle E.. M.A., Teacher................Champaign.
Weston, Margaret. B.L., Teacher ....Champaign.

Class of 1890.

Barr, James, Capt., B.S., Electrician................. .. Chicago.
Bawden, S. D.. Capt., B.S., Machinist...............Beatrice, Neb.
Beardsley John, B.L., Real Estate ....Champaign.

Benson. Edward M.. B.S., Civil Engineer........Rathdrum, Idaho.
Bowsher, Columbus A.. Teacher. ....Champaign.
Camp. Norman H.. B.S.. Law Student. ....Knoxville. Tenn.
Clark. Frank H., Capt.. B.S.. Draughtsman....... ... ...Chicago.
Clark, Thomas A., B.L.. Instructor in University of Illinois,.. ....Champaign.
Clarkson, James F., Capt.. B.S., Civil Engineer .. ..Chicago.
Clinton, George P., B.S., Assistant in Botany, Agricultural Experiment Station, University of Illinois ....Champaign.
Cooke. Robert J., Capt.. B.S., Civil Engineer.......Dubuque, Iowa.
Cornelison, Robert W., B.S.. Student, Harvard College ....Cambridge. Mass.
Crabbs. Clarence L., Capt., B.S., Civil Engineer...........Chicago.
Fisher Frank. Capt.,. B.S........................... ..Chicago.
Gilliland, Wm. M.. B.S., Draughtsman....................Chicago.
Hanssan. G. Adolph, Draughtsman.................... .. Chicago.
Hazelton. Hugh. Capt., B.S., Mechanical Engineer ... ...Chicago.
Keene. Edward S.. B.S.. Assistant in Machine Shop. University of Illinois ....Champaign.
McCandless. H. W.. B.S., Draughtsman ... .Chicago.
McKee, Will E., B.S., Draughtsman. ... ... Chicago.
Manny. Walter I.. Law Student, Mich. University..Ann Arbor. Mich.
Moore. Byron L., B.S.. Chemist. ....Cumberland. Md.
Nesbit, Edwin. B..S.. Draughtsman... ....Chicago.
Peoples. U. J. Lincoln. Draughtsman.... ....Ft. Wayne. Ind.
Proctor. Orla A.. B.S.. B.L.. Vice President College of Mo. and Professor Natural Science ....Harris. Mo.
Schaefer, Philemon A.. Mexican Government Survey.Parral. Mexico.
Shamel. Charles H.. M.S., Professor of Chemistry. Microscopy, and Toxicology ... .Keokuk. Iowa.
Snyder, C. Henry. B.S., Civil Engineer....................Chicago.
Stevens, Fred W.. Chemist ....Chicago.
Terbush. Linsley F.. B.L., Reporter. ... .Chicago.
Tresise. Frank J., B.S.. Civil Engineer........ .....Geneva. N. Y.
Tscharner. John B.. B.S.. Supt. Water and Light Co..Waco. Texas.
Waterman, Fred W.. B.S., Mechanical Engineer. Duluth. Minn.
White, James M., B.S., Assistant in Architecture, University of Illinois ....Champaign.
Wilber, Frank D., B.S.... .... Champaign.
Wilkinson. Geo. E., B.S., Principal of Public Schools. Emporia. Kas.
Wilson. Robert C.. B.S.. Medical Student .... .. Philadelphia, Pa.
Boyle. Anna C.. B.L......... ... .Champaign.
Brumbach, Lucia R.. B.L., Mrs. E. C. Bogardus.....Seattle, Wash.
Clark. Edith L.. at home .. ..Urbana.
Ellars. Jessie. B.A.. Teacher......... ....Tuscola.
Kennard. Katherine. B. L., at home..................Champaign.

Class of 1891.

Barclay, Thomas, B.S., Chemist ....Plainfield.
Bouton, Charles S., Reporter ....Hyde Park.
Boyd, Willard A., B.S., Draughtsman .... Chicago.
Braucher, Ernest N., B.S., Draughtsman........................ Chicago.
Bunton, Fred L., B.S., Machinist........................ Kewanee
Chester, Dick H., B.S., Chemist .... Pittsburg, Kan.
Chester, John N., B.S., Solicitor for Boughen Engraving Co... ....Cincinnati.
Clarke, Edwin B., Capt., B.S., Draughtsman........................Chicago.
Clarke, Frederic W., Capt., B.S. Draughtsman........................ Chicago.
Eidman, Edward C., B.S., Civil Engineering........................ Edwardsville.
Eno, Frank H., Capt., B.S., Civil Engineering........................ Chicago.
Fischer, Lawrence, Architect ....Decatur.
Frahm, Hans, B.L., Columbian Law School........................New York City.
Frederickson, John H., B.S., Architectural Iron Works .. Chicago.
French, Ransford M., B.S., Architectural Designing ...... Chicago.
Gardner, Frank D., B.S., Assistant in Agriculture, Experiment Station, University of Illinois .... Champaign.
Gibson, Charles, B.S., Civil Engineer........................S. Chicago.
Green, Thomas S., B.S., Reporter........................St. Louis.
Harris, Jay T., B.S., City Surveyor ....Champaign
Harvey, Alfred E., Capt., B.S., U. S. Government Work on the Illinois River........................
Hay, Walter M., B.S., Civil Engineering ....Chicago.
Hobbs, Glenn M., Assistant Physical Laboratory, University of Illinois........................ Champaign.
Howorth, Thomas J., B.A., Reporter .... St. Louis.
McClure, Ora D., Capt., B.S., Civil Engineer........................Cheyenne.
McCormick, Wirt, B.L ....California.
Maue, August, B.L., Teacher........................Mokena.
Mitchell, Charles J., B.S., Civil Engineer........................ Chicago.
Peabody, Lorin W., Mechanical Engineer........................Philadelphia.
Powell, John H., B.S., Instructor in Projection Drawing and Descriptive Geom., University of Illinois........................ Champaign.
Richart, Frederic W., B.S., Electrician........................Carbondale.
Shamel, Clarence A., B.S., Farmer ....Willey.
Shattuck, Walter F., B.S, Teacher in Art Institute ....Chicago.
Smolt, Franklin O., Capt., B.S., Chemist........................LaSalle.
Terrill, Joseph S., B.S., Assistant in Entomology....Lexington, Ky.
Vail, Charles D., Capt., B.S., Civil Engineering........................ Cheyenne.
Wallace, Ross S, Capt., B.S., Mechanical Engineer...Sioux City, Ia.
Young, Charles B., B.S., Draughtsman........................Aurora.
Beach, Laura M., at home........................Champaign.
Broaddus, Alice V., B.S., Teacher........................ Forrest.
Butterfield, Helen, B.L., Teacher........................ Mattoon.
Carson, Annie, B.L., Teacher ....Urbana.
Darby, Nellie M., B.L., Teacher........................Urbana.
Heller, Opal B., B.L., Teacher........................Urbana.

Jones, Isabel E., Student in University of Illinois... ..Champaign.
Jones. Mabel, B.L.. Teacher .. ..Champaign.
Myers. Clara. B.L. . . ..Evanston.
Paine, Sarah M.. Student in University of Illinois ......Champaign.
Shattuck, Anna F., B.L., Student in University of Illinois..Champaign
Seibert, Emma, B.S., Teacher........ ....

1892

SEPTEMBER.

S	M	T	W	T	F	S
..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
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OCTOBER.

S	M	T	W	T	F	S
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NOVEMBER

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DECEMBER.

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JANUARY.

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FEBRUARY.

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MARCH

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APRIL.

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1893.

MAY.

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28	29	30	31	..	..	..
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JUNE.

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JULY.

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AUGUST.

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1893.

SEPTEMBER

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OCTOBER.

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29	30	31	..	..	..	..
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NOVEMBER.

S	M	T	W	T	F	S
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19	20	21	22	23	24	25
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DECEMBER

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THE UNIVERSITY CALENDAR.

1892-93.

FALL TERM—1892.

Sept. 12, Monday.	Entrance examinations begin.
Sept. 13, 14, Tuesday, and Wednesday.	Registration Days.
Sept. 15. Thursday.	Instruction begins.
Nov. 24, Thursday.	Thanksgiving Recess.
Nov. 28. Monday.	Instruction resumed.
Dec. 19. Monday.	Term Examinations begin.
Dec. 21, Wednesday.	Term ends.

WINTER TERM—1893.

Jan. 2, Monday.	Entrance Examinations.
Jan. 2, 3, Monday and Tuesday.	Registration Days.
Jan. 4, Wednesday.	Instruction begins.
Jan. 9, Monday.	Latest date for announcing Subjects of Theses for Baccalaureate Degrees.
March 20. Monday.	Term Examinations begin.
March 22, Wednesday.	Term ends.

SPRING TERM—1893.

March 21, 22, Tuesday and Wednesday.	Registration Days.
March 23, Thursday.	Instruction begins.
April 17, Monday.	Latest day for presenting Conklin Oration.

April 29, Saturday.	Latest day for presenting Commencement Theses and Orations.
May 25, Thursday.	Senior Examinations begin.
May 29, Monday.	Hazleton Prize Drill.
May 30, Tuesday.	Competitive Drill.
May 31, Wednesday.	Term Examinations begin.
June 4, Sunday.	Baccalaureate Address.
June 5, Monday.	Class Day.
June 6, Tuesday.	Alumni Day. Conklin Prize Orations.
June 7, Wednesday.	Twenty-second Annual Commencement.

FALL TERM—1893.

Sept. 11, Monday.	Entrance Examinations begin.
Sept. 12, 13, Tuesday, and Wednesday.	Registration Days.
Sept. 14, Thursday.	Instruction begins.
Nov. 30, Thursday.	Thanksgiving Recess.
Dec. 4, Monday.	Instruction resumed.
Dec. 18, Monday,	Term Examinations begin.
Dec. 20, Wednesday.	Term ends.